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MEDICAL NOTES

PREPARED EXPRESSLY FOR HIS STUDENTS BY

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MEDICAL NOTES.

1. Science, to be complete, must necessarily include both the visible and the invisible, or, in other words, physics and metaphysics.

2. Physics is natural science, or that which pertains to the *material* universe; while metaphysics is *mental* science, or that which pertains to the spiritual universe, and the latter is the realm of force or power.

3. The practice of medicine embraces something of science and something of art; and a knowledge of it must be gained either by study and observation, or by intuition, or both.

4. Intuition is the immediate and spiritual perception of truth. It is a faculty which may be more or less developed in all persons.

5. Medicine, as generally taught, includes seven branches, viz.:—Anatomy, physiology, chemistry, therapeutics, surgery, tokology and medical jurisprudence.

6. Pathology is really a branch of physiology. Both are manifestations of the same power and governed by the same laws. Conditions only, differ; and the different conditions are what give different results. Pathology is physiology seen under unfavorable conditions.

7. Anatomy is the *science of structure*, as applied to organized beings. Its chief divisions are animal and vegetable anatomy. The latter belongs to Botany.

Animal anatomy is divided into human and comparative. The latter investigates the structure of the lower animals as compared with that of man. Human anatomy embraces general, surgical, and morbid anatomy. The latter investigates the structure of *diseased* parts and is sometimes called *pathological* anatomy. Surgical anatomy investigates structures more frequently requiring surgical operations.

8. Surgery is a contracted form of Chirurgery, and signifies "hand-work," or manual operations. It requires for the best practice the best knowledge and skill in all departments of medicine.

9. Physiology is the *science of vital action* as manifested in organized bodies. It studies the body in motion and explains the uses of all the various parts in a state of health.

10. Chemistry is the *science of molecular life*. It is based on what is known as the atomic theory, and investigates the properties of all known elementary substances of the visible or material universe, both alone and in combination with each other.

11. Therapeutics is the *application of remedies* for the cure of disease.

12. Tokology is the *science of reproduction*.

13. Medical jurisprudence is the *legal aspect of medicine*.

14. Disease is a general term, including pain, distress or inconvenience, arising from some lesion or injury of the body, or the loss of some part itself, or of its perfect use. An imperfect body is incompatible with health.

Disease has many degrees and manifestations, but no plural. We can speak of diseases as we speak of clouds or waters, but they are all essentially one thing, pain or distress.

The cause of disease is really some *error of thought* or feeling. The error leads to unsatisfactory results in the body, and these results cause distress of mind, known as disease.

The cause of disease may proceed from one or many finite minds. The universal man is embodied in many forms.

In the indissoluble *chain of being*, which connects the invisible primal cause of all things with its ultimate material effects, there are many links; and each link, save the first and last of the chain, is, in human language, called alternately cause and effect; but it is manifest that all material things are only effects of an invisible cause. The latter is ordinarily considered beyond the pale of scientific investigation. Such a position makes science strictly materialistic. For the best results we must be able to connect effects with *primal causes*; and these are always immaterial, or supernatural; not unnatural, or contrary to nature, but *above* or *beyond* nature. True science will, when fully understood, make it appear that all *material causes* are themselves *effects*.

Force or power cannot be perceived by any *outward* sense ; we perceive only its manifestations or effects. We reach the primal cause by logic and intuition.

The various symptoms of disease give rise to many terms or names of disease ; but nosologists differ widely as to number and name.

Cullen makes 149, McBride 180, Sauvages 315, Vogal 560, and the Royal College of Physicians, in London, 1,146 diseases.

15. As to remedies, different schools as well as different physicians, also, differ widely.

The United States Pharmacopœia has 1000 remedial agents ; the German 560 ; and yet according to Scudder, in "Specific Diagnosis," there are only twenty remedies in general use, and of these only five or ten are in common use ; while one professor in a medical college made the following wonderful announcement : "Armed with calomel and the lancet I am prepared to combat all diseases." Such practice is now nearly obsolete ; the true practice will consist in finding the cause of disease and removing it, thus giving conditions necessary to recovery.

16. One of the earliest symptoms of disease is some abnormal change or disturbance in the circulation of the blood, and any irritation, whether of the mind or body, disturbs the circulation.

17. The best protection against disease is not disease itself, in the form of Vaccina, or any disease as the result of inoculation for the same or similar disease ; but *the best possible health* secured by the best possible manner of living. To fortify the mind against disease by a health education is the best prophylactic.

18. Disagreeable impressions produce nausea with the same certainty as ipecac, and erroneous thoughts and feelings in regard to the physical plane of life are sure to result in disease.

The symptoms of disease are many, and in the absence of intuitive perception constitute the principal means of diagnosis, aided, perhaps, sometimes by a history of the case. The following are some of the leading symptoms with their recognized indications.

19. *Symptoms:* Cold sweats indicate prostration ; hot and dry skin, feverish excitement ; moist and warm skin, health ; ringing in the ears, nervous debility or use of quinine ; inability to rise, general debility, paralysis, rheumatism, fractures, and dislocations ; inability to lie down, asthma and pleurisy ; coma, compression of

the brain as in apoplexy, epilepsy, and poison of alcohol and opium ; deafness, wax in the ear, paralysis of the auditory nerve, or effect of quinine ; pupil contracted, inflammation of the brain, or use of opium ; pupil dilated, amaurosis (obscure vision from paresis or paralysis of the optic nerve), apoplexy, and effect of belladonna, or stramonium ; muscæ volitantes (floating specks in the field of vision caused by viscid and impure humors, or media of the eye), dyspepsia ; pain in the right shoulder, inflammation of the liver ; pain at the end of the urethra, stone in the bladder ; pain in the knee unattended with soreness and swelling, inflammation of the hip joint ; pain of the abdomen diminished by pressure, colic ; pain of the abdomen increased by pressure, peritonitis or inflammation of the bowels ; vertigo (giddiness), disorder of the liver, nervous debility, and, if severe, an attack of apoplexy or epilepsy ; gums and tongue pale, anaemia and loss of blood ; blue line along the gums, lead poisoning ; gums prone to bleed, scurvy or purpura ; taste bitter, liver complaint, or effect of iodide of potassium ; taste metallic, metallic medicines in the system or air ; teeth loosened, scurvy, or effect of mercury ; excessive thirst, high fever, diabetes, or effect of hemorrhage ; yellow tongue, hepatic disorders ; tongue brown or black, effect of medicines or contamination of the blood ; tongue livid or purple, effect of suffocation ; tongue tremulous, early stages of typhoid or typhus fevers ; tongue red, eruptive fever or inflammation of the mouth and throat ; tongue whitish, pneumonia (inflammation of the lungs) ; tongue protrudes to one side, hemiplegia (paralysis of one side) ; tongue red on the tip and edges, gastric or typhus fever ; excess of fibrin in the blood, inflammation ; excess of red corpuscles, plethora, sugar in the blood and urine, diabetes ; uric acid in the blood or urine, gout or rheumatism ; excess of urea in the blood, Bright's disease ; palpitation of the heart, dyspepsia, exciting mental emotions or excessive use of narcotics ; pulse increased in frequency, fever or some arterial excitement ; pulse intermittent, dyspepsia and obstructed circulation ; pulse irregular, disturbance of the functions of the brain ; pulse small and rapid, great prostration from hemorrhage or protracted and wasting disease ; breath foul, indigestion, bad teeth, constipation, or excessive carnal indulgence ; hiccough, acrid matter in the stomach, or mortification of some part connected with the vagus

(pneumogastric) nerves; stertorous breathing (relaxation of the velum palati), coma and cerebral oppression.

20. "Congestion" is an engorgement of the part with blood.

21. Inflammation is an infiltration and stagnation of the blood in some part owing to an excess of waste matter in the system, excess of fibrin, or lack of vital force.

The symptoms of inflammation are heat, pain, redness (where red blood circulates), and swelling.

The results of inflammation are various. We may get resolution (subsiding without serious injury), suppuration, gangrene, adhesion, effusion, or induration.

Suppuration is the formation of pus.

Gangrene is the death of the part.

Adhesion is the uniting of parts naturally separate.

Effusion is the pouring out of serum into some closed cavity or tissue of the body.

Induration is the hardening of the part, as when a scar is formed.

22. The amount of blood is about of $\frac{1}{3}$ the entire weight of the body.

23. A saturated solution of common salt keeps the blood permanently fluid, thus preventing the formation of fibrin.

24. The blood consist^{of} blood corpuscles and plasma (or liquor sanguinis). The plasma contains fibrin (in solution) and serum. The serum consists of water, albumen and salts.

25. The normal specific gravity of the blood is about 1.055.

26. The coloring matter of the blood is termed haematin.

27. The substance of the corpuscles is termed haemoglobin.

The corpuscles loaded with oxygen are termed oxyhaemoglobin. The globulins do not dissolve in pure water, but are more or less soluble in a solution of common salt.

28. The number of pulsations per minute is in the adult about 72, but much depends upon circumstances. It is increased by various emotions of the mind and by exercise. The pulse of the infant is about 130 per minute. It may be felt in the radial artery at the wrist.

29. The rate of pulsation to respiration is about 4 to 1. If respiration is 18 per minute, the pulse may be 72.

30. The fibrin of the blood amounts to 3 to 10 parts in 1000. It is greater in inflammatory conditions.

31. The water is 79 per cent. of the blood.
32. The tension of blood in the aorta is about 6 inches of mercury; and it flows in the aorta about one foot per second; in the capillaries $\frac{1}{30}$ of an inch per second.
33. The capillary is about $\frac{1}{100}$ of an inch in length.
34. The blood completes its circuit in about 30 seconds.
35. The lungs have a double circulation—the bronchial and pulmonic; i.e. two sets of vessels. The pulmonary artery carries blood to the lungs for purification; the bronchial arteries carry nutriment.
36. *Phlebotomy* (vein cutting) is venesection, or blood-letting. Flint and Waring still recommend it in double pneumonia and puerperal fever. Flint and some others predict it will again become common. Robust persons bear it better than the debilitated.
37. *Check hemorrhage* by (1) continued pressure; (2) by torsion; (3) by ligature. Hemorrhage from small vessels may be checked by some strong astringent like alum; or styptic, like tincture of iron.
38. *Hæmoptysis* is “spitting of blood.” It generally occurs between puberty and the age of 35. The blood may come from the mouth or throat, but usually from the mucous membrane of the lungs. In most cases it arises from congestion of the lungs, and requires warming and stimulating treatment, with moderately full and deep inspirations to *air the blood*. In *active* hemorrhage from some mechanical injury of the lungs, rest must be enjoined and a moderate use of the lungs.
39. *Hæmatemesis* is “vomiting of blood.” The blood generally comes from the mucous membrane of the stomach, but in case of injury may come from other parts. Give the stomach rest.
40. Protoplasm (first formed) is the name applied to the first cell, or matter from which an organism is formed. It contains all the vital properties of highly organized bodies.
- The homogeneous matter of protoplasm forms by differentiation all the various tissues of the body.
41. All skin disease is dependent on the abuse of drugs, some error of diet, excessive irritation, mechanical injury, deficient vitality, or want of oxidation of the blood. In some cases, the skin becomes infested with itch mites and other animalcules. These scavengers can be destroyed with a weak solution of corrosive sub-

limate, two grains to an ounce of water. Label, "For external use only." Apply twice per day.

42. Tetter, Lichen, and Herpes are equivalent terms,

43. Lupus (wolf) is eating tetter, and is sometimes called "Noli me tangere."

44. Impetigo or Eczema is moist, crusted, or humid tetter.

45. Psoriasis is scaly tetter.

46. Ringworm is "Herpes circinatus," because it describes a ring or circle. Apply once or twice per day a solution of corrosive sublimate—two grains to the ounce of water.

47. Porrido favosa is the honeycomb tetter; so called because the scabs are honeycombed. Porrido (to spread) is a general term including scald-head, baldness in patches (called Porrido decalvans), and two kinds of tetter, viz: Porrido favosa and Porrido larvalis. The latter is the milky tetter, and is so named because it sometimes covers the face with crust, as with a mask. Tetter is of Anglo Saxon origin and signifies "foul."

48. Exanthem (to "bloom out") is a general term for *any* rash or eruption of the skin. Rash is of French origin and signifies itch. Eruption, from the Latin, signifies to "break out."

49. Erythema (redness) and Roseola, or Rose-rash, is an efflorescence of the skin in patches.

50. Scabies, Psora, Pruritus, and Prurigo, are all general terms for any *itching*, or Itch. Psoriasis also indicates a "scratchy condition," but is applied to the *scaly* tetter or dry scall.

51. Urticaria ("nettle"-rash) is characterized by a stinging sensation. In Scotland it is called Hives. The cuticle is elevated into wheals that sting and itch. It is caused by eating of shell fish, old cheese, and other acrid matters.

52. Acne (of uncertain origin) consists of an eruption of slowly suppurating tubercles, usually appearing upon the face and skin of young persons.

53. Pityriasis is a "branny" tetter, similar to Psoriasis minus the itching. It is caused or aggravated by the use of salted provisions. An application of lanoline improves the appearance of the skin.

54. To *cleanse the skin from a greasy appearance* and make it soft, apply a little *lemon juice*; or use the following: pure

distilled glycerine $\frac{1}{2}$ oz., powdered borax $\frac{1}{4}$ oz., and camphor water (obtained of the druggists) one pint.

Tincture of benzoin, a teaspoonful to a pint of water makes a pleasant lotion.

55. To whiten the skin, the best powder is *French chalk* (a fine variety of soapstone, found at Briancon, a small village in France), or French chalk mixed with *precipitated carbonate of zinc*. The latter may also be used alone.

56. *Paleness* of the skin must be removed by friction, wholesome food, air, sunlight, and judicious exercise to improve the red corpuscles of the blood.

57. Lime water and vinegar, four parts to one, or Glycerine of borax are excellent washes for scurf.

58. Alopecia ("fox," said to be sometimes bald) is the general term for baldness. For baldness, apply with friction, once a day, a preparation of tincture of cantharides one part, and eight parts of castor oil.

59. *Lepra* (scaly) includes the leprosy of the ancients, and various other affections. Healthy nutrition is its only cure.

60. *Purpura* (a purple color) takes its name from livid spots where venous blood has settled. It is a kind of scurvy, arising from the effects of mercury and deficient aeration of the blood.

61. For a medicine to purify the blood make an infusion of Prince's Pine (*Pipsissewa*) leaves, and preserve with one-seventh part of deodorized alcohol, or rectified spirit. One ounce of the leaves is sufficient for one quart of water; may add, if you please, bark of Burdock root, or the *fresh* root of Yellow Dock. If you desire something already prepared, use the "Compound Syrup of Sarsaparilla," which is official. May give of either from one spoonful to a wineglassful, two or three times per day. The latter will act slightly upon the bowels; or to speak more properly will be more quickly expelled, as it contains senna.

62. Warts are sometimes *charmed* away by counting them, and telling the patient that in ten days they will be gone. They may be destroyed by touching repeatedly with chromic, or glacial acid, the colorless tincture of Iodine, or Caustic Potash.

63. *Erysipelas* ("I draw near," from its tendency to spread and involve other parts,) is an inflammation of the skin, more or less deeply seated, with general fever and a bad state of the blood.

For this condition use, both internally and externally, camphor water and boracic acid, 5 grs. of the acid to one ounce of camphor water; dose of the same a tablespoonful every two hours till the fever subsides. Give lemonade freely, and if the bowels are inactive, give at night 15 grs. of hyposulphite of soda dissolved in a cup of water.

64. Scarlatina (deep red) is Scarlet Fever, simple. Scarlatina maligna is "Canker Rash" (canker and rash). Scarlatina anginosa is sore throat accompanied by scarlet fever.

65. The Major Exanthemata include small pox, measles and scarlet fever.

The premonitory systems of the Major Exanthemata are pain in the head, neck and back; nausea and vomiting in bad cases, and an eruptive fever. In small pox the pustules appear in three to five days, and in about five days more fill with pus; in measles and scarlet fever the eruption is *not pustular*, but generally causes desquamation of the cuticle. In measles the skin is rough, in scarlet fever smooth. The period of incubation is ten to fourteen days.

66. Vaccina (kinepock, or cowpox) is small pox caused by voluntary or compulsory inoculation with matter from an infected cow. It causes more or less disease, injury and loss of life, depending on the sanitary condition of the patient and the malignancy of the matter introduced.

67. Law of contagion: All disease is contagious, directly as its malignancy, and inversely as the soundness of the person exposed.

68. In scarlet fever secure perspiration; in small pox keep the patient in a cool room and give rum punch as an antiseptic.

69. Camphor water and boric (boracic) acid is a safe and efficient remedy for all forms of zymotic disease, including small pox, measles, scarlet fever, erysipelas, diphtheria, typhoid fever and rheumatism.

70. A *small pox* patient should be placed in the attic or upper room, for two reasons; that he may have good air, and that the air may more readily remove and oxidize the infectious matter. Ozone and oxygen are the best deodorizers. The eruption appears first on the forehead and lips the second or third day, and in bad cases "runs together," forming confluent small pox. At first the eruption consists of coarse red spots; three days later (the 6th day) vesicles appear, and on the 8th day these are changed to pustules; on the

11th day, pus oozes out, dries and forms scabs. Treat with rum punch, and solution of boracic acid. Apply the latter, mixed with glycerine to keep the skin soft and prevent pitting. Before vaccination was practiced the mortality was about 16 per cent. It is now given as 50 per cent. of all persons under 5 and over 40 years. Under the usual treatment the malignant cases invariably prove fatal.

The cause of small pox was attributed by Jenner to the "Grease" (sore heels of the horse) which according to him is identical with vaccine matter. Vaccination is therefore only another name for small pox inoculation, which was prohibited in England by act of Parliament. Varioloid (like small pox) is only another name for small pox occurring in persons known to be vaccinated. It is commonly assumed that small pox is always the result of contagion, that one attack protects from a second, and that vaccination is a preventive. These positions of the profession are incorrect. The first case could not possibly have been a case of contagion, and if developed once it must always be under the same or similar circumstances, for the laws of nature are always uniform. Second and even third attacks of small pox are on record and well known; and vaccination with matter identical with small pox-matter cannot by any possibility prevent small pox since it always communicates the disease and thus perpetuates it. The cause of small pox is believed to be the decomposition of urea in the system, and the only permanent remedy against the disease is a wiser mode of living and better blood.

71. *Yellow Fever* is peculiarly a disease of the digestive organs, with contamination of the blood. It incubates for a week and ends in a week. There is inflammation of the stomach, with severe nausea and vomiting; pain in the back, and in the calves of the legs; hemorrhage from various parts, and suppression of urine. The liver is yellow and filled with oil globules. The remedy will be found in correcting the dietetic habits and environments rather than in quarantine regulations.

72. Hot climates do not require so much fuel (carbonaceous food—fat, sugar and starch) as colder climates.

73. Dropsy is a general term including ascites (dropsy of the abdomen), hydrocephalus (dropsy of the head), hydrothorax (dropsy of the chest), hydrocele (dropsy of the scrotum), and

anasarca (dropsy of the flesh). It implies a clogging of the lymphatic vessels, which prevents the return of serum—usually called lymph, transfused in the capillaries and lymph spaces—into the circulation as in health. The remedy will be found in clearing the system of all impurities by natural means—deep breathing, flushing the colon, moderate exercise, *fresh* provisions, and a close diet, free from any excess of fat, starch and sugar.

74. Gout is an inflammation of the joints, generally of the fingers and toes, and is equivalent to Arthritis. It took its name from the French, “*goutte*” signifying drop, which was believed to be distilled upon the part, “drop by drop.” It is caused by the deposition in the ligaments and tendons of the joints, of the urate of soda, which again has its origin in the use of soda, or baking powders, and derangement of digestion. Wine of colchicum and rhubarb were the old remedies, but wholesome living is the only infallible preventive as well as cure.

75. *Atheroma* of the arteries is represented by hardness of the pulse, the “*arcus senilis*” (ring around the iris of elderly persons), irregular action of the heart, partial blindness and loss of memory. Keep the bowels free with hyposulphite of soda. Some authors advise hypophosphites.

76. In *pneumonia* with a full and bounding pulse, may give gelseminum. Put half a teaspoonful of the tincture in half a goblet of water and give a teaspoonful of the mixture every hour till the skin is moist and the pulse softer. Pilocarpin (active principle of Jaborandi) is the most reliable diaphoretic (produces sweating). Give not more than $\frac{1}{6}$ of a grain, and repeat if necessary in six hours. Usually one small pill will suffice to break up pneumonia. Give hot lemonade freely, and induce the patient to breathe deeply as possible to air the blood.

Deep breathing, alone, provided the patient be kept warm in bed, will cure pneumonia. The blood which clogs the lungs will resume its usual flow in the arteries as soon as it is properly oxidized and decarbonized in the lungs.

77. Pleurodynia (pain of the side) is a rheumatic affection of the muscles of the side of the chest. It hurts to move the arm, but does not hurt to breath deeply as in pleurisy, and is unattended by fever or cough. It yields to hot fomentations, hot lemonade, massage, and good air deeply inhaled. A little bicarbonate of soda—

5 to 10 grains—may be administered to neutralize the uric acid diathesis, and soda water may be used for bathing.

78. *Rheumatism* (to flow) is an inflammation of the muscles or joints, and is due to fermentation in the stomach and bowels, which vitiates the blood and secretions. The inosit of the muscles becomes changed to sarco-lactic acid, and urea to uric acid.

79. *Neuralgia* (nerve pain) is rheumatism of the nerves. Sunlight and out-door life is the best prophylactic (means of prevention.)

Neuralgia may be caused or aggravated by drugs, especially mineral poisons and narcotics. Operations usually performed for neuralgia, such as stretching the nerve and cutting it out, do not remove the cause of the trouble. It is necessary to eliminate all excess of waste from the system, purify the blood, and invigorate the nerves by the use of suitable food and an abundance of pure air.

80. *Appoplexy* (to strike down) is a sudden loss of consciousness and voluntary motion from undue pressure upon the brain. It is distinguished from Epilepsy (to seize) by the absence of convulsive movements. Stertorous (snoring) breathing indicates heavy pressure upon the brain.

It is due to pressure upon the brain arising from congestion, hemorrhage of the brain, or embolism (plugging of a blood vessel by a clot or coagulum). An excess of fat, fibrin, or waste in the blood may cause it. Keep the patient warm and comfortable as to temperature of body and well supplied with pure air to breathe.

81. *Asthma* is difficulty of breathing. It is similar to Heaves in horses. It may be detected, even during the intervals of attacks by auscultation. Place the ear over the lung upon the back, and direct the patient to inhale deeply. From asthmatic patients you will hear a peculiar squeak as the air passes through the constricted passages. It is caused by inhaling nicotine of tobacco, by catarrh of the lungs, and by excessive alimentation. It is temporarily relieved by smoking dried saltpetre paper. Constitutional treatment is the only permanent cure.

82. We breathe about 30 cupid inches of air at each inspiration, and use 450 cubic feet in 24 hours. The normal number of respirations per minute is about 18. Under excitement or just after violent exercise it is increased. If, without any unusual exercise or

excitement, the rate of respiration is increased to 25 or more per minute, we may look for disease of the lungs.

83. The normal temperature of the body is about 98.6° Fah. or 37° Centigrade.

The sources of heat are oxidation, condensation, friction and electricity.

Animal heat is sustained chiefly by the oxidation of hydrocarbons in the system.

84. The weight of the human brain is about 40 ounces, but it varies from 2 to 4 lbs.

85. The voluntary nerves are under the control of the human will; the involuntary are controlled by a force or power, of which we are not conscious. The involuntary nerves are termed "sympathetic nerves."

The centres of organic life (including the circulation, respiration and deglutition), reside in the medulla at the base of the brain.

The heart is governed by nerves from the vagi, and the sympathetic and intrinsic ganglia. The vagi are the pneumogastric nerves.

The velocity of nerve impulse is about 100 feet per second.

The anterior root of the spinal nerves is motor; the posterior, sensory. The motor nerves respond to the sensory. The impulse travels forward through the cord.

Injury of the third cranial (motor oculi) gives rise to Ptosis (drooping of the upper lid), and also to strabismus (squinting or cross-eye).

The simple directing of the consciousness or attention to a part is often sufficient to excite action.

Mental shocks may be as severe and fatal as those to the body.

86. Albuminuria implies that albumen is found in the urine. It is by some considered synonymous with Bright's disease, and is divided into acute and chronic. The acute is also called nephritis, and is an inflammation of the tubules of the kidneys. The chronic is a fatty degeneration of the kidneys. If any excess of albumen or albuminoids is taken with the food, it is quite likely to appear in the urine.

87. The normal specific gravity of the urine varies from 1.005 to 1.020. Sugar in the urine may raise the specific gravity to 1.040 or even to 1.050.

The secretion from the kidneys is about 50 ounces, or something over 3 pints in 24 hours.

The urine is generally slightly acid, as determined with litmus paper, but may be alkaline.

The urine of carnivora is acid; of herbivora, alkaline.

Urea (chemical formula H_4N_2CO) is the principal secretion of the kidneys. It is held in solution in the water, and is the nitrogenous waste of the tissues. The decomposition of urea gives rise to uric (lithic) acid.

The amount of urea secreted is about one ounce in 24 hours, or 200 to 500 grains.

When sugar is found in the urine the condition is named Diabetes Mellitus.

Diabetes (flow through) is an excessive flow of urine.

The principal *morbid deposits* in the urine are urates (lithates), uric acid, phosphates, pus, mucus, etc.

The *morbid constituents* are blood, bile, sugar and albumen. Bloody urine is called Hæmaturia.

Uric acid, or urate of soda in the urine, may give the *appearance* of blood in the urine.

Uric acid gives rise to gravel and calculus. It appears as a sediment, like powdered cayenne.

Urate of soda forms the brick dust sediment.

Uræmic (urea in the blood) *poisoning* leads to epilepsy, and coma (profound sleep).

Bright's disease (degeneration of the kidney) is attended by dropsy and uræmia.

In nephritis and Bright's disease, enjoin rest in bed and use *milk diet*, prohibiting tea, coffee and stimulants.

The course of Bright's disease is *not continuously* downward. Periods of improvement often follow the most aggravated symptoms, until a sudden attack of uræmia terminates life.

In congestion or inflammation of the kidneys, the urine is scanty, high-colored and albuminous.

In *Diabetes* (both with or without sugar,—two forms) there is an increased flow of urine varying from one to five gallons per day. In diabetes mellitus (sweet diabetes) the urine yields from one to twenty ounces of sugar per day. Distinguished from Bright's

disease by the absence of dropsy, which always attends Bright's disease.

Diabetes mellitus implies an excess of sugar and starch in the food of the patient.

88. *Retention of urine* implies a distended bladder, which may usually be felt distinctly just above the pubes, and is, in recent cases, very painful. Is generally due to spasmodic stricture.

If a hot sitz bath does not relieve, a nervine, or relaxant may be tried, and, if necessary, use the catheter. In cases of disease of the kidneys the bladder may be found full and the urine dribbling away fast as secreted. This is called *retention with overflow*. As a final resort to relieve great pain the bladder is sometimes tapped, either from the rectum or above the pubis. Tapping is also performed in cases of hydrocele, and ascites.

The quantity of urine passed is decreased by perspiration, and increased by chilling of the skin. The skin is supplementary to the kidneys. Animal food increases the quantity of urea in the system, or in the urine.

89. DaCosta prefers the use of the Bismuth test for sugar in the urine. Add to equal parts of urine and liquor potassæ a pinch of bismuth subnitrate, and boil thoroughly. If sugar be present the powder turns brown or black.

Another test for sugar is fermentation, by adding yeast and keeping in a warm place for twenty-four hours. If sugar be present it is changed to carbonic dioxide (which escapes in bubbles) and alcohol.

If albumen be present in urine it will be coagulated by heat (same as the white of an egg) or by nitric acid.

90. The following are some of the more important tests of uroscopic physicians. No froth on shaking indicates spinal trouble with determination of blood to the head. Froth settles immediately, pregnancy. Much froth, lung disease. Coarse froth, seminal trouble. Bubbles rise from the bottom, disease of the heart. Urine filled with little hairs feathered like a goose quill (shown by aid of the eye glass), kidney complaint.

91. The usual *period of dentition* of the infant is one to two years, and for the permanent teeth ten to fourteen years.

The first, second and third *permanent molars* appear soon after, or about, the 6th, 12th and 18th years respectively.

The teeth of the lower jaw generally precede those of the upper.

The temporary teeth usually (though infants have been born with teeth) begin to appear in the seventh month, and to fall out in the seventh year.

Of the permanent teeth, the central incisors, the lateral incisors, the anterior bicuspids, and the posterior bicuspids appear respectively the 7th, 8th, 9th and 10th years. The canines appear the 12th or 13th year.

92. The *portal circulation* is the circulation through the vena portae and liver for the secretion of bile. *Hemorrhoids* (flow of blood) consist of livid and painful tumors at the lower part of the rectum, sometimes within and sometimes without the external sphincter muscle. The common name is piles. Sedentary habits, torpor of the liver, and sluggish circulation of the blood in the portal system are predisposing causes, and any strain of mind or body may be the exciting cause.

93. Seven passages open from the pharynx (throat). Name them. See Dutton's Anatomy.

94. Reflex action is the unconscious or involuntary action of a motor centre in response to a sensory impulse.

95. Ataxia signifies disorder or irregularity.

Locomotor ataxia is uncertainty of gait, and is an affection of the posterior columns of the spinal cord.

96. Chloroform affects, first, the sensory nerves at the periphery of the nervous system; secondly, the cerebral hemispheres as indicated by loss of consciousness; and third, the organic centres as indicated by *stertorous breathing*. Do not push its effect beyond the second stage.

Whiskey—an ounce or two—taken before *inhaling chloroform* sustains the heart and prolongs the chloroform narcosis. Remove false teeth, and allow free access of air with the vapor of chloroform. Do not allow the tongue to drop back so as to close the larynx.

Old drunkards are unfavorable subjects for chloroform. Do not give it after prolonged fasting. Protect the nose and mouth by intubation with oil. Do not give chloroform during the first stage of labor, nor when it lessens the force of uterine contractions, nor after the head has passed the pubic arch. The vapor of ether is inflam-

mable (lights if near should be held above the level of the ether), but chloroform is not.

97. *Antiphlogistics* (opposed to inflammation) are remedies or agents that reduce the blood and pulse. The old remedies were bleeding, calomel, and tartar emetic; the more modern are aconite and Veratrum Viride; and the new, are diet, air, exercise, and time.

The term antiphlogistic is now nearly obsolete, as the theory of Phlogiston (a burner), which was used by Stahl to account for the phenomenon of combustion, has been abandoned, but the old remedies with which to fight this imaginary principle are still to some extent retained.

98. Water (H_2O ; Latin, "*aqua*,") turns to ice at 32° Fah. (or 0° Centigrade), and to steam, which is invisible, at 212° Fah. (100° Centigrade). Its specific gravity is 1.000 or 1, that is, it is the standard for liquids and solids.

Its greatest density is at 39° Fah., or 4° Centigrade. At 32° its bulk is increased 10 per cent. It generally extinguishes fire, but sets fire to potassium. To cleanse water, boil and filter. Soft water forms a lather with soap; hard water curdles and wastes soap. Tincture of soap makes hard water turbid, but does not affect pure water. Water is the common carrier of creation, and a solvent for many substances.

Heart and lung troubles are increased by the use of saline waters. The waters of Saratoga are saline.

Vichy (of Central France) is an *alkaline water*. It is taken for obesity, gout, and rheumatism.

The Geyser and Congress (of Saratoga), and the Carlsbad (of Bohemia) are *saline* waters, and are given in affections of the liver and portal system, but are injurious in affections of the heart and lungs not dependent on the stomach and liver.

The Friedrichshall (Germany) and the Kissingen (Bavaria) are aperient, or *laxative*. The Friedrichshall is a bitter water.

The Kreutznach (Prussia) is powerful *alterative*, and is given in strumous affections.

99. The pupil contracts under the influence of strong light, nicotine and morphia; it dilates in the dark, in asphyxia, and under the influence of atropine or belladonna.

Amaurosis (obscure) is dimness of vision, or complete blindness,

owing to *paralysis of the optic nerve*. Dimness of vision from opacity of the crystalline lens constitutes "cataract." We may get dimness of vision, or blindness from opacity of the cornea due to inflammation.

Irregularity of the pupil is due to inflammation of the iris (the colored curtain around the pupil).

A watery eye is due to obstruction in the tear passages (lachrymal canals or nasal duct).

Gutta serena (clear drop) gives floating specks in the field of vision. It is a symptom of dyspepsia.

100. *Eye wash* to allay pain and irritation: One grain of morphine dissolved in one ounce of water. This an excellent application for an inflamed eye. Two or three drops will allay the pain and irritation at once. With the patient in the recumbent position the liquid may be easily dropped into the inflamed eye.

101. Purulent discharge from the ear is generally due to disease of the tympanum (drum) or bones of the tympanum. Fever sores are really disease of the bone or periosteum.

Rupture of the membrana tympani may be detected by forcibly expiring with the mouth and nose closed.

102. Tumor of the antrum (superior maxillary sinus) may crowd upon the eyeball and cause it to project.

103. Polypus of the nose is due to excessive irritation of the nasal passages, or to cachexia (bad condition of the blood); generally the former.

104. Ozœna (fetid smell) is an offensive discharge from the nose, due to chronic ulceration of the pituitary membrane and bones that form the different meatuses of the nose, the superior maxillary, inferior turbinate, sphenoid, ethmoid, nasal and frontal.

105. Epithelioma (mobid condition of the epithelium) is cancer of the skin, occurring mostly in the lower lip of smokers.

106. The tongue has usually a *white* coat in pneumonia, brown or dark coat in typhoid fever, a brown or dirty color in dyspepsia; is pale from loss of blood, and has the appearance of the surface of the strawberry in scarlet fever.

107. "Osis" (as a termination) signifies "condition," and in pathology a morbid condition.

108. *Iitis* (as a termination) signifies inflammation; as Gastritis.

tis, inflammation of the stomach; Meningitis, inflammation of the meninges (membranes) of the brain.

109. The Centigrade thermometer has just one hundred degrees between the freezing and boiling parts, while Fahrenheit has one hundred and eighty; so one degree of Centigrade is equal to $1\frac{8}{10}$ degrees of Fahrenheit. The freezing point is marked 0 on the C. and 32° on Fahr. To reduce Fahr. to C. subtract 32 and divide the remainder by $1\frac{8}{10}$. To reduce C. to Fahr. multiply by $1\frac{8}{10}$ and add 32: thus $4^{\circ} \times 1.80 = 7.20$, and $7.20 + 32 = 39.2^{\circ}$ Fahr.

110. The water bath may be used for temperatures below 212° Fahr. (100° C.) Oil boils at 260° C. (500° Fahr.), and below this the oil bath may be used. For higher temperatures the sand bath may be used.

111. A surgeon requires instruments and appliances. He usually carries forceps, ligatures, adhesive plaster, scissors, catheters and an abscess lancet.

112. *Amputation* (cutting off) may be expedient in some cases of gangrene and comminuted fracture.

Five different operations upon the foot are known as Chopart's, Lisfranc's, Pirogoff's, Syme's, and Hey's. Chopart's operation leaves only the astragalus and calcaneum; Lisfranc's separates the metatarsal from the tarsal bones; Hey's saves as much of the metatarsal bones as the case will allow; Pirogoff retains only a portion of the calcaneum; and Syme removes the foot at the ankle joint, cutting off the malleoli.

113. *Rachitis* (inflammation of the spine) is more commonly called "Rickets." It is caused by improper diet. There is a deficiency of earthy matter in the bones, and deformity in consequence. The treatment is wholly hygienic. Give milk and lime water.

114. *Pott's Disease* is vertebral disease, though commonly defined as angular deformity of the spine, owing to caries of the vertebrae. It is attended by rigidity of the spine, pain, soreness and abscesses, and sometimes paresis (partial paralysis) or complete paralysis. The treatment is constitutional, with the recumbent posture or a plaster jacket.

115. *Ankylosis* (crooked) is a stiff joint. It is generally caused by inflammation after mechanical injuries. Passive motion

will generally prevent this difficulty. When threatened, the elbow should be kept at right angles, the knee straight.

116. A *fracture* is a breaking of the bone. It requires adjustment with perfect rest for two or three weeks, then slight motion for one or two months, depending upon the state of health. Fractures are simple, compound, comminuted, oblique, transverse, and multiple.

A *fracture* is known by deformity, unnatural mobility, and by crepitus (harsh grating), which may usually be felt and heard on manipulation. Crepitus will be absent unless the broken surfaces are made to touch and move upon each other. If great swelling prevents a diagnosis wait till it subsides, but enjoin rest.

Fractures uniting after six weeks are said to be "delayed," and if not united in twelve weeks are "*ununited fractures*." These occur from cachetic conditions of the system, from undue mobility of the fragments, or from too great a separation.

Pott's fracture is fracture of the lower fifth of the fibula. It is dressed by a splint (like Dupuytren's) that allows of no pressure between the external malleolus and head of the fibula. Dupuytren's is a straight splint extending from the head of the tibia on the inner side to a point below the sole of the foot.

For *fractures of the leg* use the fracture box, which keeps the leg in position without compression.

117. *Callus* (hard) is the secretion of new bony matter that acts as a cement to unite bones. It is first plastic lymph, then cartilage, which becomes ossified in four to eight weeks. A "provisional callus" is first formed that serves to hold the fractured ends in juxtaposition. After about one year the provisional callus is removed.

118. Laudanum and water — one part to two — forms a good *lotion for bruises* (contusions).

119. Luxation (displacement) is a dislocation, or putting out of joint. It may be due to mechanical violence or muscular force. Luxation gives no crepitus. There are four dislocations of the hip and four of the shoulder.

120. *Sprain* is a strain or wrenching of a joint, more frequently of the wrist or ankle, by which the soft parts about it are stretched or torn. It is also called *subluxation*. Immediate rubbing,

or massage, by the patient himself or by another is the best treatment. If the pain and swelling are severe, apply hot fomentations or evaporating lotions.

121. *Arthritis* is inflammation of a joint, including all the structures about it. If only the synovial membrane is inflamed it is *synovitis*.

122. *Coxalgia* (hip pain) is arthritis of the hip joint. It occurs more frequently before the hip bone becomes consolidated (about the 14th year). It may occur from injury, but is generally connected with some cachexia, like scrofula.

123. *Psoas* (loin) or *Lumbar abscess* is an abscess of the psoas muscle. It generally points in the groin below Poupart's ligament. The lumbar plexus of nerves is situated in the back part of the psoas muscle, and an abscess here may be confounded with rheumatism. If discovered before any swelling appears in the groin, it may be opened above Poupart's ligament, where its progress is apt to be arrested. The treatment is antiseptic and constitutional.

124. *White swelling* is a swelling of the knee or other part destitute of red blood. It is curable like other swellings, but requires time—several weeks or months.

125. *Inflammation of the bones* may affect the membrane around the bone, the bone itself, the marrow, or the epiphyses, giving rise to periostitis, osteitis, osteomyelitis, and epiphysitis. A diseased bone usually gives rise to "fever sore," which may be called an abscess upon the bone. Treat constitutionally, and when the bone becomes sound the fever sore will be cured.

126. *Hemorrhoids* (bloody flux) or piles, are swellings about the anus, due to a varicose condition of the hemorrhoidal veins. They are either internal or external in relation to the external sphincter muscle. The *internal sphincter* lies about an inch within the anus; and is formed by a band of circular fibres of the intestine. Give mild laxative diet and remove all strain of mind or body. For temporary relief insert a cocaine suppository ($\frac{1}{4}$ grain.) For itching, wash thoroughly and apply twice per day a solution of boracic acid, 5 or 10 grains to the ounce.

127. For Anal Fissure and *Ulcers of the Rectum* keep the bowels free by laxative diet, invigorate the vital forces, and use night and morning a warm injection of boracic acid and water. If

there is pain let the evening injection be an ounce of starch water with twenty drops of laudanum, to be retained if possible.

128. *Sarcocele* (fleshy tumor) is applied to any solid enlargement of the testis, malignant or non-malignant.

129. *Carcinoma* is the technical term for cancer (a crab). *Scirrhous* is a "hard" cancer. *Sarcoma* is a "fleshy" excrescence. *Hæmatodes* is a "bleeding fungus." In all cases of cancer the blood must be cleansed and the vital forces restored in order to cure. The knife may remove a troublesome wen, or non-malignant tumor, but cannot reach a malignant sore; it comes from the blood.

130. *Bronchotomy* (cutting the bronchus) includes laryngotomy (cutting the larynx) and tracheotomy (cutting of the trachea). (See Trachea and Larynx in Anatomy). It is performed to admit air to the lungs, and to extract foreign bodies.

131. In opening a *mammary abscess* make the incision in the direction of the radii from the nipple, injuring few as possible of the lacteal ducts. Cancer of the breast generally occurs after the 40th year. It is very hard at first, soon becomes fixed to the ribs, the nipple is retracted, and there are sharp darting pains.

132. *Paronychia* (near the nail) is an inflammatory tumor of the fingers and toes. It may be quite superficial or deep, and is better known as whitlow or felon. A free incision is generally considered good surgery. Before cutting or opening a felon it is well to try immersing it for twenty minutes in a strong alkaline bath which may arrest it if not too far advanced or too deep. May use soda water, or lye of wood ashes.

133. *Sarcoma* (tumor of the flesh) includes malignant and non-malignant growths.

134. A small, hard mass, in the abdomen slightly changing its position from time to time, is probably a mass of faeces impacted in the colon.

135. A fluid tumor in the loin or groin may be due to pus from a psoas, or lumber abscess.

136. *Tympanites* (drum) is the name given to the abdomen when distended with gas. The gas is usually the result of fermentation and decomposition of matters in the intestine.

137. Great pallor and faintness following an injury, may be due to internal hemorrhage.

138. For ingrowing toe-nail apply on cotton wool a solution of two drams of liquor potassæ to an ounce of water, to the margin of the nail till it is softened; it can then be cut away without pain.

139. A *fistula* (pipe) is a suppurating canal, or sinus, leading to or from a mucous cavity. A "fistula in ano," is a sinus (pus canal) leading from the lower part of the rectum into or through the adjoining tissues. It is generally caused by constipation and a sluggish circulation of impure blood.

140. In the absence of other satisfactory evidence the *exploring needle* will enable you to determine the character of the fluid filling an abnormal cavity.

141. *Poultice for gangrene* and phagedenic (eating) ulcers: ground flaxseed 4 oz., pulverized slippery elm 1 oz., and one tea-spoonful each of powdered charcoal, sulphur and carbonate of soda.

142. A *sinapism* ("mustard" poultice) should be made of two parts of rye flour to one of mustard, and not allowed to blister. In old and debilitated persons extensive sloughing may follow the use of blisters.

143. A *shock, or concussion*, is the effect upon the body of a blow or violent emotion that reaches and more or less paralyzes the nerve centres. Keep the patient warm and wait for reaction, unless some wound to the body requires immediate surgical aid, like tying an artery or removing some depressed portion of the cranial bones.

144. In case of *hemorrhage* avoid all stimulants.

145. *Sutures*, for closing deep wounds, are the continuous (glover's stitch), the interrupted, pin suture, quill suture, Lambert's, Czerny's, etc. Lambert's and Czerny's are used for wounds of the intestine. Sutures may usually be removed about the fourth day. Avoid sutures of the face so far as possible, and remove the second day.

146. For antiseptic dressing surgeons generally use carbolic acid 1:20 or 1:40, bichloride of mercury 1:500 or weaker, and dust of iodoform. Boracic acid may be used in solution, or deodorized alcohol; also tincture of Myrrh.

147. *Hæmatoma* (blood tumor) often quickly follows contusion of the scalp. Apply collodion.

148. To *set the clavicle*, stand behind the patient, place the knee between the shoulders and draw both shoulders backward

until the clavicle comes to its place, then apply a bandage. Keep on the dressing for five or six weeks.

149. To set the shoulder, extend the limb forcibly in the direction of the glenoid cavity, or place the unshod heel in the axilla and pry over it. Place a pad in the axilla with the arm to the side for a week, make passive motion for two weeks, and then allow the patient to use his arm.

150. To set the elbow, flex the forearm forcibly over the knee, or make extension from the hand.

151. Dislocations of the wrist, fingers and toes are reduced by simple extension. Prof. Crosby, of Dartmouth, set the thumb by pushing it back till it stood perpendicularly on the metacarpal bone.

152. There are four dislocations of the hip-joint. The head of the femur may be on the dorsum (back) of the ilium, on the pubis, in the obturator foramen, or in the sciatic notch. The first and last are backward luxations, and the others forward luxations. To reduce backward luxations, flex the leg on the thigh and the thigh on the abdomen, adduct (carrying toward the other limb), circumduct (upward and outward), and extend. Briefly stated, "Flex, adduct, lift up, bend out, roll out." The operation will be best understood by taking the hip bone and femur in the hands and observing that the hip bone serves as a fulcrum, to bring the head of the femur to its place in the socket.

The forward luxations are somewhat difficult, especially when the head is above the pubis. For this latter kind of dislocation make extension backward and outward. When the head is in the thyroid (or obturator) foramen the pubis will serve as a fulcrum if we carry the flexed limb high and inward over the body. After reduction bandage the knees together with a towel between them for one week, use passive motion in bed for two weeks, and wear moulded support for two months.

153. To set the knee, flex the thigh, make extension, and push the bone into place. Not difficult.

154. Lateral dislocation of the patella is easily adjusted by direct pressure when the limb is extended (straight). If necessary, forcibly depress the margin of the patella furthest from the centre of the joint. In upward displacement of the patella the ligament below is torn, and must be treated as a fracture, keeping the leg

extended and the sundered parts contiguous. Inflammation may follow all injuries. Dislocation of the ankle is frequently complicated with fracture.

155. *Aneurism* (distended) is a *pulsating* arterial tumor, caused by rupture of the inner coats of the artery and dilatation of the outer coat. It is either filled with blood or coagulum. It is always soft at first and grows hard, if at all, afterwards.

Valsalva's treatment was spare diet to diminish the tension of the blood. Others treat by compression, ligature, and injection of the sac.

156. In *dislocation of the jaw*, one or both condyles are advanced and the mouth is open as in yawning. Press down the posterior molars, or place a cork between the posterior molars as a fulcrum, and raise the chin.

157. A *poison* is a material substance whose nature is hostile to animal life. There are over 100 inorganic poisons, 140 vegetable poisons, and of animal poisons we have over twenty kinds of poisonous fish, and several poisonous serpents, flies and insects. (See Dunglison's Med. Dictionary).

There are very few perfect antidotes to poisons. Vinegar or oil will generally neutralize an alkali. In any case olive oil or new milk is a safe remedy; albumen, like the white of eggs, will mollify the action of many acrid substances in the stomach; but the general treatment is to eject the poison, or dilute it.

158. For convenience the abdomen is divided into *nine regions* by four artificial lines—two perpendicular and two horizontal. (See Dutton's Anatomy, p. 368, middle and bottom.)

159. The principal regions of the chest are the anterior, lateral (side), posterior, above the clavicle, below the clavicle to the third rib, mammary (3d to the 6th rib), above the sternum, and under or beneath the sternum, above and below the third rib.

160. *Percussion* is striking or rapping upon the chest or other parts to ascertain by the sound the character of the structure beneath or within. One or two fingers pressed against the chest make a convenient pleximeter (percussion measure). The resonance is described as "clear" or normal in health; and as "tympanic" (drum-like), "dull," or "flat" in disease. The "flat" sound is the entire want of resonance. "Dullness" is the partial or imperfect resonance.

161. *Ausculation* is "listening" by applying the ear directly, or by using the stethoscope (breast-viewer). The normal sound of respiration is called the "vesicular murmur." It resembles the wind among the pines. The adventitious sounds heard in auscultation are termed "rales" (rattles).

162. Rales are divided into "dry" and "moist" rales. Moist rales are produced by air passing through fluids in the air passages, and may be due to mucus, blood or pus. Instead of rale, the word "rhonchus" (snorting) is sometimes used. Cavernous respiration is due to a cavity in the lung *not* filled with fluid, but communicating with a bronchial tube; cavernous rales (or gurgling rales) are due to a large cavity containing fluid through which the air passes.

163. *Fremitus* (murmur) is the vibration or thrill of the chest as determined by palpation ("touching" with the hands).

Vocal fremitus is the thrill, or vibration, produced by the voice; tussive fremitus, by coughing; friction fremitus, by friction of the pleurae; and bronchial fremitus by the air in the bronchial tubes as it passes through mucus, blood or pus. In hepatization of the lung, the vocal fremitus is increased; in feeble persons diminished.

164. A *wound* is a solution of continuity usually attended with hemorrhage.

Wounds are *incised* when made by a cutting instrument; *punctured* by a pointed instrument; *lacerated*, when torn; *confused*, when bruised; and *poisoned* when some virulent substance has been introduced.

165. To retain parts in apposition use adhesive straps, and if necessary, sutures, except on the scalp, which is very firm and liable to erysipelas.

166. In dissection wounds apply antiseptic dressing and give milk punch.

167. Hemorrhage from *sloughing of a ligature* usually occurs between the tenth and fifteenth day.

168. *Arteries* must be *tiered* at both ends.

169. Extract all *foreign substances* in dressing wounds unless to find and remove would be more dangerous than to leave the work to the healing power inherent in the system.

170. Catgut is sometimes used as a ligature and allowed to remain.

171. *Hernia* (sprout or shoot) is the protrusion of some inter-

nal organ or part, from its natural cavity. The three great cavities of the body are those of the skull, chest and abdomen. Abdominal hernia is most common, and is named from the aperture by which the hernia escapes—inguinal, femoral and umbilical.

Inguinal hernia is a protrusion of the bowel or omentum, through the inguinal canal (see p. 426 and the three following of Dutton's Anatomy).

To reduce hernia, put the patient upon his back with the lower limbs flexed, give large clysters of gruel or warm water, and apply hot fomentations.

Avoid active purgation. Lobelia enemata may be useful to relax the muscles.

172. Pus is the product of suppuration. A collection of pus in any part of the body constitutes an abscess. An abscess may be known by fluctuation elicited by palpation.

173. To destroy an *insect in the external ear passage*, fill the passage with oil. The oil closes the spiracles of the insect and kills it.

174. *Laparotomy* (cutting into the abdomen) is sometimes performed for the removal of tumors, hernia, intussusception (or invagination), etc. The incision is made in the linea alba midway between the umbilicus and pubes.

175. The *abdomen may be distended* by gas, serum, faecal matter, and tumors, and, in the female, by the gravid uterus.

176. *Hunter's canal* contains the femoral artery and vein, and the saphenous nerve at the middle of the thigh.

177. The abdominal aorta has been tied eight times without success, and the innominate artery sixteen times with fifteen fatal cases. In 789 cases of ligature of the common carotid, 324 died; 4½ per cent. died when the external carotid was tied. Ligation of the common iliac artery has been performed 39 times, and only 10 successful. Of 124 cases of popliteal aneurism, pressure succeeded in 66 and failed in 58. Of the 58, the artery was tied in 44, 8 were amputated.

178. *Sphacelus*, or slough, is the term applied to the part disorganized by mortification.

179. In the hand and foot *let nature amputate*; she gives a better stump.

180. Dr. Abernethy, of London, declared that it is owing to

our ignorance that instruments and *operations* are necessary ; and Dr. W. Beach adopted as a maxim "Seldom or never operate."

181. *Monsel's solution* is a solution of the sub-sulphate of iron. It is an excellent styptic (stops hemorrhage from small vessels) and will destroy the syphilitic vegetations of the glans and prepuce.

182. *Bacteria*, *Micrococci* and *Vibriones* are synonymous terms. They are microscopic living creatures in the form of jointed rods. *Microbes* is another more recent term for microscopic life. They cannot propagate in healthy tissue.

183. When the blood and tissues reach a certain state of decomposition, then, and then only, is *germ-life* possible.

184. *Conception* (receiving or bringing together) is the impregnation of the ovum.

185. The *signs of pregnancy* are changes in the uterus, *mammæ*, and menses ; morning sickness in pathological cases ; immediate settling of the froth upon the urine after agitation in a vial ; sensible motion of the *fœtus* ; "ballottement;" and sounds of the *fœtal heart*.

186. The *period of gestation* is, generally, ten lunar months (280 days,) but may, occasionally, be protracted to ten calendar months (300 or more days).

187. The *three stages of labor* are (1) dilatation of the cervix uteri, so that the head passes into the vagina, (2) expulsion of the child, and (3) expulsion of the placenta, or afterbirth.

188. Of 12,633 children born at the Maternity Hospital, in Paris, 12,120 were *head presentations*, with the face posteriorly.

189. Symptoms of *approaching labor* are (1) subsidence of the uterine tumor, (2) increased moisture and laxity of the vulva, and (3) in many cases, mental anxiety. Subsidence may continue from 12 hours to 2 weeks.

190. *Symptoms of labor* (parturition) are clearing of the rectum and bladder, and sometimes of the stomach ; "Show;" and regularly recurring pains, or uterine contractions.

191. Be sure that the bladder and rectum are empty during the second stage of labor.

192. Twins, or *plural births*, are not more frequent than one case in eighty.

193. *Anæsthesia* (privation of sensation) is induced by *spirits* of chloroform. It is a great relief in many cases during the close of

the second stage of labor, and also in case the placenta is removed by surgical aid.

194. The ovum has two membranes, *amnion* and *chorion*, and the uterus one extra membrane during gestation,—the “*membrana decidua*.” The latter is a product of the uterus. The amnion is the *inner* membrane of the ovum, and the embryo floats in the liquor amnii.

Sometimes there is water or serum between the amnion and chorion, constituting “false waters.”

195. The *liquor amnii* varies from a few ounces to one or more quarts; and from a clear and inodorus fluid in health to one viscid and foul.

196. The *placenta* (a cake) is the “afterbirth,” and weighs about a pound. It is connected to the umbilicus of the foetus by the *funis*, or umbilical cord. The placenta has two faces, foetal, connecting with the cord, and a maternal face, connecting with the inner surface of the uterus (womb).

197. The *funis* (cord or rope) has an average length of 20 inches, but varies from 6 to 60 inches. It consists of a vein (the umbilical) and two arteries (hypogastric). The latter come off from the internal iliac arteries of the foetus. They are longer than the umbilical vein and wind around it. The vein of the cord carries arterial blood, and the arteries venous blood.

198. *Lochia* is the discharge of serum, which is more or less bloody, for two or three weeks following the birth.

199. *Primipara* is the term applied to the mother who bears her first child. The plural is *primiparæ*.

Afterpains are rare in primiparæ; much more so than in subsequent births, in *multiparæ* (those who bear many children).

For excoriated nipples keep the parts clean and apply tincture of myrrh twice per day.

200. Ergot is dangerous. Use warm fomentations, or sitz bath if need be. “*Arte non vi*” (by art not by force) is the maxim in childbirth.

201. Induction of *premature* labor may be accomplished by the hot and cold douche, or by rupture of the membranes. Ask consultation before resorting to it.

202. *Abortion* is “miscarriage,” or expulsion of the foetus

before it is *viable* (sufficiently developed to live, which occurs about the seventh month).

203. The *causes of abortion* are mechanical injury, disease of the mother or fœtus, and rupture of the membranes inclosing the liquor amnii.

204. *Phlegmasia dolens* (swelled leg) is due to venous obstruction, or poisoning of the blood.

205. *Milk Fever* is caused by overdistension of the mammae, and stagnant condition of the blood.

206. A *lacerated perineum*, if severe, may require a surgical operation; but if slight may be left to heal with proper care of the patient.

207. The tumefied scalp and malformed head (*caput succedaneum*) of the new-born infant, is caused by pressure in the birth and naturally disappears in a day or two.

208. A mother's mark (*Nævus materni*) is due to the increased vascularity of the capillaries of the part, caused by nervous impulses during gestation.

209. *Cancerous tumors* are not composed of any definite or characteristic elements that at once stamp their nature. Soft cancer is made up almost entirely of cells and nuclei—only enough fibre tissue to hold these cells together. Cancer usually infiltrates the surrounding tissues. A soft cancer filled with blood is a *hematoid variety* (*Fungus hæmatodes*).

Epithelioma (epithelial cancer) affects the skin and mucous membrane—lip, tongue, rectum, os uteri, and genitals. It consists of cells, and may be destroyed by the galvanic cautery. Cancer is a disease of degeneracy like the decay of fruit.

210. *Abscess* is a collection of pus in a cavity formed by the breaking down of the tissues. The pus is generally, sooner or later, discharged from the surface either directly or through some mucous canal. When situated beneath some firm membrane, or fascia, it requires the aid of the knife.

211. *Hectic* (habitual, or consumptive) *fever* often attends the formation of a deep-seated abscess, especially of the lungs.

212. *Polyphus* (many footed) is a term applied to tumors of mucous membranes, as those of the nose, throat, uterus, and more rarely stomach, bladder and vagina.

213. A *fibrous tumor*, or “*fibroid*” is of a dense texture and

whitish color. They are chiefly found in the uterus. When found on a nerve it is called "neuroma." A subcutaneous fibrous tumor is a hard, movable tumor beneath the skin. When troublesome they may be easily removed by the surgeon.

214. A *cartilaginous tumor* (Enchondroma) is commonly met with in connection with bone. They sometimes grow within the bone and expand it into a shell.

215. *Epulis* (upon the gum) is an excrescence sometimes ending in cancer. It grows from the bone.

216. *Chancre* is a canker sore, or ulcer, on the genital organs; generally caused by impure sexual commerce. It is the first phase of syphilis, or pox. If the poison is malignant or the blood bad, it often causes an abscess of the groin—called bubo ("groin," or inguinal gland). The terrible symptoms known to the profession as tertiary ("third stage," bubo being the second) syphilis are largely due to the effects of mercury so generally administered for this complaint. Two or three applications of tincture of bloodroot (sanguinaria) will quickly cure chancre in ordinary cases. If the blood is bad give constitutional treatment and improve the general health.

The indurated chancre (called, also, Hunterian chancre) is a thickening and hardening of the part from the effects of the poison and inflammation. Apply antiseptic washes, but no caustics unless to destroy excrescences.

217. *Urethritis* (inflammation of the urethra) is generally, but improperly, called Gonorrhœa (flow of sperm). It is generally the effect of impure sexual commerce. The period of incubation is usually four or five days. It is characterized by a mucous discharge, ardor urinæ (scalding of the urine), and sometimes by Chordee in the male, by gleet, stricture, balanitis, or phimosis.

218. *Orchitis* (inflammation of the testicle) is also a possible symptom. *Gleet* is the name given to the watery discharge that attends the subsidence of the inflammation. Stricture rarely occurs, or orchitis, unless from the use of caustics.

219. Sebaceous cysts are tumors found on the scalp. They may be solid or liquid.

220. *Bronchocele* (bronchial tumor) wen, or *goitre* is hypertrophy, or enlargement of the thyroid gland. It is attributed to the

habitual use of hard water, at the base of lofty mountains. See Dutton's Anatomy, p. 391.

221. *Leucoma* is a "white" opacity of the cornea and is the result of inflammation. A similar condition of the crystalline lens is called "cataract."

222. An *ulcer* is a solution of continuity of the mucous membrane, or skin, caused by cachexia (bad state of the blood). They frequent the alimentary canal, ankles, and sometimes other parts. Apply tincture of myrrh, or a solution of boracic acid, while you treat constitutionally.

223. *Gangrene* (mortification) takes place from permanent obstruction of the circulation, or from withdrawal of the vital force, or spirit. The sloughing eschars (disorganized portions) may be hastened by poultices.

224. *Anthrax* (a coal) is a carbuncle, or malignant boil. It is the "Charbon" of the French, and is sometimes called a malignant pustule, or "anthrax malignus." It is the effect of septicaemia, or blood poisoning, and was formerly supposed to arise from the malignant matter of hides of animals, but is known to arise, also, primarily, in the human. Use, both internally and externally, camphor water in which is dissolved boracic acid, 10 grs. to the ounce.

225. *Calculi* (small stones) are earthly concretions found in the human body. The "tartar" on the teeth is of this nature. Calculi are generally found in mucous cavities and canals—the mucus serving as a nucleus—and are most common in the biliary and urinary passages. The concretions in the joints of gouty persons are a compound of uric acid and soda.

226. There are six varieties of urinary calculi, viz.: Uric (or Lithic), Mulberry, Bone-earth (Phosphate of Lime), Triple, Fusible, and the Cystic. The latter is rare, only six or seven having been observed. The Mulberry is dark brown, very hard and noduled. It is oxalate of lime.

The uric acid calculus is most common of all, and the Mulberry second in frequency.

Calculi when small are called sand or gravel.

227. *Biliary calculi* are generally called "gall-stones." They choke up the cystic and biliary ducts and thus cause jaundice. The base of gall-stones is either cholesterine (solid bile) or adipocere

(fatty wax). They are often only inspissated (thickened) bile. The human body left some weeks in water assumes the appearance of adipocere.

228. *Concretions* are sometimes found in the stomach and bowels. They come from the food and consist of woody fibre, plumb stones, seeds and skins of fruit, magnesia, and in the intestine of hairy animals, balls of hair.

229. *Cancer of the stomach* gives pain of a sharp, burning nature and *fetid* eructations. Dark grumous matter is vomited. Give mild antiseptics like boracic acid, milk, soups and raw egg.

230. *Gastritis* (inflammation of the stomach) is manifest by pain and tenderness in the epigastrium, thirst, nausea and vomiting. Give the *stomach* rest for a season, then mucilaginous drinks, milk and lime water, cream and raw eggs. In ulceration of the stomach food must be taken in small quantities at short intervals, thus giving the ulcers a chance to heal.

The "coffee-grounds" vomit is altered blood.

231. Iodide of potash is given to eliminate mercury from the system.

232. *Cholera* is not a highly contagious disease. It is caused by debilitating circumstances, unripe fruit, putrid meat, or decaying vegetables. The remedies are antiseptics and stimulants. It is quite amenable to treatment in the early stage. Give hyposulphite of soda, and rum or brandy. For cramps, hot applications. The opium treatment is extolled by some authors. Boric acid is preferable.

233. *Dyspepsia* gives a great variety of symptoms; viz., anorexia (want of appetite), nausea, pyrosis (hot sensation in the stomach with acrid eructations), bad taste in the mouth, irregularity of the bowels, headache, palpitation of the heart and other sympathetic affections of the most diversified character.

234. *Cardialgia* (heartburn) is a pain at the cardiac orifice from acidity of the stomach and fermentation. It is relieved by alkaline remedies—alkaline infusion of rhubarb. A bitter taste with white fur on the tongue is removed by vegetable acids (lemon juice); and fermentation may be checked by hyposulphite of soda. Of the latter the average dose is 15 grs. in a glass of water.

235. Stercoraceous (faecal) vomiting indicates some serious ob-

striction of the intestine. It may arise from strangulated hernia, hardened faeces, foreign bodies, intussusception, cancer, and possibly from nervous action.

236. Stones in the bladder of the male are generally removed by a surgical operation, either cutting or crushing. *Cutting for stone* is called Lithotomy. It proves fatal one time in three in aged persons and about half as often in youth.

In females dilatation of the urethra has nearly succeeded lithotomy (cutting for stone).

237. The remedy for *jaundice* is an active course of cathartic treatment—Epsom Salts taken in cider. For permanent cure, correct the diet, state of the mind, and exercise.

238. Hiccough is a spasmotic contraction of the diaphragm with simultaneous closing of the glottis. It is a symptom of irritation of the vagus (pneumogastric nerve), caused by acrid matter in the stomach or by gangrene.

239. Sighing is a long and deep inspiration, and indicates the need of more air to oxidize the blood.

240. The atmospheric air contains about 21 per cent. of Oxygen, and 79 per cent. of Nitrogen, with a trace (.04 per cent.) of carbon dioxide (CO_2). Ten per cent. of CO_2 in the air respired proves rapidly fatal.

241. Asphyxia (pulseless) is suspended animation from want of air.

242. Tetanus (stretched) is the long continued and involuntary contraction of one or more muscles, caused by a rapid succession of nerve stimuli.

243. Rigor mortis (stiffness of death) usually comes on from seven to twenty-four hours after death and lasts one or more days. It affects first the jaw, then the neck, trunk, arms and legs.

244. *Laryngitis* (inflammation of the larynx) affects the voice, which is hoarse, or suppressed. It is often called “sore throat.” Proper attention to the feet, and a dry flannel placed loosely around the neck at night will generally cure.

245. *Œdema of the glottis* is also called submucous laryngitis. It consists of the effusion of serum into the submucous tissue, and is often associated with erysipelas, scarlatina, and Bright's disease. The voice is suppressed, and we get dyspnoea, and a harsh, stridu-

lous cough. It requires constitutional treatment and invigorating measures.

246. *Bronchitis* (inflammation of the bronchi) is a “cold on the chest.” It is made manifest by dyspnœa, cough, and, later, expectoration.

When inflammation affects the terminal bronchial tubes it takes the name of “capillary bronchitis;” and when false membrane forms in the bronchial tubes it is called “croupous bronchitis.”

247. *Epilepsy* is a loss of consciousness *with* convulsions. It may be caused by dyspepsia, worms, and nervous exhaustion. Whatever drains the system of vitality or violently disturbs the mental equilibrium may give rise to it. It is an “electrical storm.” Uræmia is sufficient cause. In convulsions the brain is overcharged with mental stimuli. It expends its surplus upon the convulsed muscles, and thus temporarily clears the cerebral atmosphere. Each fit usually lasts from five to twenty minutes, and returns irregularly. In all cases it is cerebral debility and spasmodic action of the brain. Bromides and many other remedies have failed to produce permanent cures.

248. *Emphysema* (inflation) is an escape of air into the areolar tissues, from injury of the air passages.

249. *Pneumothorax* (air in the chest) is the escape of air into the pleural cavity around the lung.

250. *Epistaxis* (dropping upon) is nosebleed. Stand erect, hold the nose with one hand and raise the other arm perpendicular. This allows the blood to return readily to the heart, and relieves the oppressed schneiderian membrane. Avoid all violent blowing of the nose, and if bleeding is habitual, adopt a light and laxative diet.

251. For *stomatitis* (inflammation of the mouth) and canker, correct the diet and apply tincture of myrrh, or a weak solution of boracic acid.

252. *Stricture of the œsophagus* is usually associated with hysteria.

253. Breathing the fumes of *mercury*, nitric and hydrofluoric acids invites disease of the mucous membranes.

254. *Chlorine* often destroys the sense of smell, and invites coughs, pneumonia, and death. It is a poisonous gas.

255. *Quinine* produces cutaneous eruptions like eczema and erythema. Quinine also produces deafness.

256. *Mercury* produces ulcers and canker sores, enlarged tonsils and glands of the neck, caries of the bones, fetid breath, dropping of the teeth, and tubercular consumption.

257. *Phosphorous* used in making matches produces mental dulness, catarrh of the stomach, loss of appetite, pain of the arms and wrists, and necrosis of the jaws.

258. *Arsenic* produces pustular eruptions and leaves permanent marks and stains.

259. *Arsenic* acts especially on the mucous membranes. It produces œdema (swelling) of the eyelids, itching, eczema, and falling of the hair. One-half grain has caused symptoms of poisoning, and 2 grs. may prove fatal.

260. The hypnotic (sleeping) effect of *opium* is promoted by alcohol and chloral; its sudorific (sweating) effect by ipecac. The excretions are locked up by opium, and the mucous secretions lessened; the pupils contract; the pulse at first rising, becomes slow and relaxed; respirations are deep and slow, sometimes stertorous (snoring); unconsciousness ensues; its effect resembles alcohol narcosis (drunken stupor), cerebral hemorrhage, and uræmic coma.

Morphine is less constipating and less diaphoretic, but more hypnotic, and produces more itching (pruritus) than opium. Opium does manifest harm when there is a deficiency of the secretions of the liver and kidneys, and in vomiting from cerebral origin. Personal idiosyncrasy greatly determines the effect. The young and the aged are most susceptible. A single drop of laudanum (tinct. of opium), or a medicinal dose given to the mother, may prove fatal to the nursing infant. In diarrhoea and dysentery, laxatives should precede the use of opium. In chronic dysentery opium is considered by the profession indispensable. Its highest utility is in inflammations of the serous membranes, e. g., peritonitis, pleurisy, etc., but when effusion (or dropsy) takes place and stupor ensues, the utility of opium is ended. Dose of morphine, $\frac{1}{6}$ of a grain; of average opium one grain. A full dose should never be given to one who has never taken any.

Strong coffee is given to antagonize opiates.

261. *Chloral* (5 to 10 grs.) is a hypnotic (puts to sleep), but is not anæsthetic (to destroy pain) like morphine. Morphine deepens its effect, and alcoholic stimulants antagonize it. It is given in full doses for sea-sickness every four hours. It is better to regulate the diet and reduce plethora before taking the voyage.

Chloral is given also for tetanus, cholera, and for rigidity of the os uteri in parturition. It is antiseptic and arrests fermentation.

262. For *emesis* (vomiting) use ipecac and lobelia, equal parts. Wine of ipecac and tincture of lobelia are most convenient. Put a teaspoonful of each in a goblet of warm water, and give the whole every ten minutes till the stomach is cleared. The sympathy between the stomach and other parts of the system is very extensive. For a quick emetic, stir a teaspoonful of *ground mustard* in a cup of warm water. A little soda in the water is a great aid if the stomach is sour; and warm hands and feet must be secured for the best effect. Nothing but an emetic will effectually cleanse the stomach of phlegm in case of catarrh.

263. Lime juice and lemon juice are important *anti-scorbutics* (against scurvy).

264. Sulphurous acid is reported an efficient application to *chilblains*. Use three parts acid to one part each of glycerine and water.

265. One grain of calcium sulphide once in two hours for a day or two may cause *boils and abscesses* to abort.

266. A saturated (dissolve all you can) *solution of borax* in rose-water removes freckles, and allays pruritus (itching) of the vagina.

267. To *clear the bowels* give "liquorice powder," butter-nut bark pills, hyposulphite of soda, rhubarb, senna, epsom salts in cider, or tincture of aloes. Sprudel salts and Carlsbad water act finely on some persons. The Alkaline infusion of rhubarb and fluid extract of senna may be combined. Aloes sometimes causes piles.

268. Elaterium is a powerful *hydragogue cathartic*. Used in ascites. Dose of the elaterium $\frac{1}{6}$ gr. Use with caution in debilitated subjects. An excessive dose causes blindness.

269. Bartholow says that *Quinine* is a "protoplasmic poison;" that it diminishes the reflex action of the spinal cord. Dr.

A. H. Smith, of Philadelphia, considers it oxytocic (hastens delivery) and gives 15 grs. at the outset of labor.

15 to 20 grs. given early, arrests, it is said, the inflammatory process in its formative stages.

In septic disease it is given in 10 gr. doses every four hours. In intermittents, Bartholow advises 10 gr. in the sweating stage, and again 5 hours before the time of the next paroxysm. He combines it with morphine. Such is regular practice in relation to quinine. We do not depend upon it in any of these cases.

270. *Poke root* is the common name for two distinct plants—*phytolacca decandra* and *veratrum viride*. They must not be confounded. The *phytolac dec.* is the garget, and is used in scrofula to act on the glandular system. The *veratrum vir.* is used by some to depress the pulse, but it reduces it only while the patient reclines. It is a poison.

271. *Lobelia* is used as an enema, cylster, or injection in strangulated hernia, intussusception, and faecal impactions of the colon. For habitual constipation give of the tincture two drops every hour, or ten drops at bed-time. For asthma, a teaspoonful every 15 minutes until nausea is induced.

272. *Nervous vomiting* and sick-headache are sometimes relieved by giving one drop, every half hour, of wine of ipecac.

273. Ipecac or lobelia given to nausea, *arrest hemorrhage* (bleeding) of all kinds except from the injury of large vessels, which must be tied.

274. *Coca* first excites, then paralyzes, the respiratory center.

275. *Deodorized alcohol*, whiskey or rum, may be used to counteract the effect of sunstroke, the poison of venomous serpents, and as an antiseptic in summer complaint, vomiting, and in zymotic (causing fermentation) disease—typhoid fever, diphtheria, small pox, erysipelas, and dysmenorrhœa.

276. Laudanum (tincture of opium) becomes very much concentrated by age; while tincture of aloes becomes milder to the taste with age.

277. *Iodine* administered internally for a long time destroys the mammae and testicles; and Iodide of Potash causes sores and ulcerations of the skin.

278. *Aqua regia* (royal water) is an efficient temporary rem-

edy for chronic hepatic (liver) disorders, like jaundice. It is composed of Nitric acid four parts, and Hydrochloric acid fifteen parts, and is given in doses of 3 to 5 drops in half a goblet of water twice a day for two or three days. For permanent cures bad dietetic habits must be corrected.

279. *Hamburg tea.* Senna leaves, eight parts; manna, four parts; bruised coriander seed, two parts; and cream of tartar, one part. Mix. Esteemed among the Germans as a cathartic.

280. *Hydrophobia* (fear of water) is the supposed effect of rabid virus. It is a rare affection, and greatly aggravated by fear. Inoculation is as bad as the bite. The remedy is vapor baths and tincture of lobelia to produce emesis (vomiting). Repeat the process, or continue it till the patient is thoroughly relaxed. The recent wound of a rabid animal may be washed with weak ammonia water, or spirit of camphor. A poultice of onion, tobacco and salt has been said to effect cures.

281. *Tetanus of the jaw*, is called trismus (gnashing), or locked jaw. Traumatic (wound) tetanus is that which follows an injury. Emprosthotonus bends the body forward; opisthotonus, backward, and plurothotonos to one side. The remedy must be one that reaches the mental stimuli, or nervous influence; — psychologic power, nervous sedatives, or powerful relaxants.

282. Insensibility after injury *may* be due to the effects of alcohol. Notice the breath and history of the patient, and see whether the pupil changes in size when you endeavor to rouse the patient. In complete insensibility from injury the pupil will remain fixed.

283. The effects of mercury, arsenic, digitalis, strychnine and iodine are *cumulative* in the system.

284. The bile is composed chiefly of two acids (Taurocholic and Glycocholic) united with soda. It has also mucus, coloring and fatty matters, cholesterin and salts.

285. The *coloring matter* of the bile depends upon the nature of the food. In man and the carnivora it is called Bilirubin (red bile); in herbivora, Biliverdin (green bile).

The coloring matter of plants is called Chlorophyl (green leaf).

286. Dextrose (or Glucose) is a variety of sugar found in many vegetable juices, especially the grape. It was so named because in

the polarization of light it refracts the rays to the right (dexter). It does not crystallize so readily, nor dissolve in water so quickly as *cane* sugar. Milk sugar is called Lactose from the Latin "Lac" (milk).

287. *Inosit* (from a word signifying "fibre") is muscle sugar, and is found only in muscle.

288. Glycogen (sweet producing) is a substance found in the liver. It is isomeric ("equal measures" of the same elements) with starch, and the sugar produced by its transformation is identical with grape sugar ($C_6H_{12}O_6$).

289. Grape sugar, milk sugar, inosit, and glycogen are termed carbohydrates, because formed of carbon and water (general formula $C_mH_{2n}O_n$).

290. Grape sugar ferments readily with yeast and forms alcohol and carbon dioxide (CO_2).

291. Milk sugar does not undergo direct alcoholic fermentation.

292. Stearine (stiff fat), margarine (pearly), and oleine (oil), are the neutral fats. They are regarded as salts composed of stearic, margaric, and oleic acids united to a common base glycerine.

293. CO_2 (carbon dioxide) is a product of combustion, of fermentation, and of oxidation of the tissues.

294. Hydrochloric acid (possibly formed from the chlorine of common salt) is found in the stomach.

295. The cell of frogs' blood is spherical; birds and fishes oval.

296. The average specific gravity of milk is 1.030, maximum 1.042; 10 per cent. of H_2O (water) reduces the gravity three units.

Chalk in milk may be detected with the microscope, and starch with a solution of iodine. It forms a blue color if starch be present.

Good milk is 10 per cent. cream; may be known by standing 24 hours in a tall, graduated vessel.

297. Common salt taken with the food causes an increase of urea in the urine. Salt also interferes with endosmosis and exosmosis (the passing in and out of fluids through animal membranes). It shrivels the corpuscles of the blood.

298. The lymphatics drain the tissues of serum, and any obstruction of the lymphatics causes dropsy. The lymphatics are

furnished with numerous valves, and exercise of the body promotes their activity.

299. Diastole (to place apart) implies dilatation of the heart; and Systole (to place together) contraction of the heart. The heart begins to contract at the upper part of the auricles and extends downward over the auricles and ventricles. The blood enters the pulmonary artery from the right ventricle at the same time that another portion enters the aorta from the left ventricle.

300. Nitrate of potash, or *nitre*, 3 to 10 grs., repeated if necessary in four hours, has a powerful influence to oxidize the blood and is given in fevers and rheumatism; but it is a poison and should not be long continued.

301. The serous (secreting serum) membranes are those surrounding the brain, heart, lungs, bowels, and testes; and they are named respectively the meninges (we regard the dura and pia mater as serous, not recognizing any arachnoid), pericardium, pleura, peritoneum, and tunica vaginalis. The latter is originally a part of the peritoneum.

302. *Fatty degeneration* of the liver is liable to ensue from excessive consumption of fats.

303. *Leucocytes* (white cells) are the white corpuscles found in both blood and pus.

304. "Ubi irritatio ibi fluxit." (Where any irritation is there it [the blood] flows).

305. *Ergot* produces gangrene of the extremities.

306. Salted provisions produce *scurvy*.

307. *Sedentary habits* invite dyspepsia, vertigo, piles and apoplexy.

308. It is not *what we eat* but what we digest and assimilate that makes us strong. We can only use in the system so much of fats and carbonaceous matter as we are able to oxidize. Food cannot keep up the flame of life without oxygen. Expand and use the lungs.

309. The blood corpuscles of the seal, wolf, and guinea pig are only slightly smaller (size $\frac{1}{3400}$) than those of man (size $\frac{1}{3200}$) about $\frac{1}{16}$ smaller and both are microscopic.

310. Fever "runs down" or subsides, for two reasons—want of waste or fuel, and want of vitality to carry on the work.

311. In Asiatic cholera, and usually in cancer, the temperature falls, sometimes to 80° Fah.

312. Digestion is not a process of fermentation but of distribution. Normally the bile is found only in the portal circulation, liver, gall bladder and bowels.

313. *Hysterical amaurosis* is real but is the result of some emotion or state of the mind, and not of any organic lesion.

314. A suppository of fine cut tobacco (10 or 15 grs). is an efficient remedy in hernia. It should be held together by a cord which protrudes for the removal of the suppository, soon as the muscles are properly relaxed. In about an hour the hernia may be reduced easily or even spontaneously when the patient lies in a proper position on his back with the lower limbs drawn up.

315. The official Dovers Powder contains opium and ipecac, of each one part, and sugar of milk eight parts.

316. Soda and cream of tartar, used in making biscuits, form Rochelle salts and carbonic acid gas, and the Rochelle salts are left in the biscuit. Such bread is therefore medicated.

317. Fusel-oil (Amylic alcohol) should be by law excluded from all beverages. It is found in all unrectified spirits made from grain, starch, or potatoes in any form, and is poisonous even in small quantity.

318. That fats are formed from proteids is proved by the cow that makes butter from grass.

319. Fractures of the olecranon and coronoid processes usually unite by ligament.

320. The motions of the wrist are chiefly at the radio-carpal joint, where the radius articulates with three of the proximal, or first row of carpal bones, viz., the scaphoid, semilunar and cuneiform.

321. The distal row of carpal bones—those nearest the metacarpal—are the trapezium, trapezoid, os magnum, and unciform.

322. The bones of the wrist, fingers, and toes, are counted from the side of the thumb and great toe.

TABLE OF ARTERIES.

1. AORTA—origin, left ventricle of the heart.

Gives off about 60 branches to all parts of the system. For full description of the aorta see pages 209-211 of Dutton's Anatomy.

2. AXILLARY—origin, Subclavian.

Becomes the brachial. The 7 branches of the Axillary are distributed chiefly to the muscles of the chest, side, and arm. They are the subscapular, 2 circumflex, and 4 thoracic.

3. BRACHIAL—origin, axillary.

Supplies the arm. The 7 branches of the brachial are the upper, and lower profunda (deep); the nutrient, that feeds the shaft of the humerus; anastomotica magna (great anastomosing); muscular, radial, and ulnar.

4. RIGHT COMMON CAROTID—origin, innominate.

Divides into the internal and external carotid.

5. LEFT COMMON CAROTID—origin, arch of aorta.

Internal and external carotid.

6. EXTERNAL CAROTID—origin, common carotid.

External parts of the head and neck. The 8 branches of the external carotid are the ascending pharyngeal, superior thyroid, lingual, occipital, facial, posterior auricular and its two terminal branches—the temporal, and internal maxillary. (These are mentioned in their order from below upward).

8. CAROTID, INTERNAL—origin, common carotid.

Supplies largely the encephalon (or brain) and parts of the eye and nose. The principal branches of the internal carotid are the tympanic (to the drum of the ear), the ophthalmic, the anterior meningeal (to the membranes of the brain), and the anterior, and middle cerebral.

9. CÖLIAC AXIS—origin, from the aorta.

Stomach, liver and spleen. The 3 branches of the cœliac axis are the gastric, the hepatic, and the splenic.

10. CORONARY, 1st branches of the aorta.

Supply the heart.

11. DORSALIS PEDIS—origin, anterior tibial.

Upper part of the foot.

12. EPIGASTRIC.

There are three epigastric arteries. The *superior* epigastric arises from the internal mammary and supplies portions of the abdominal wall over the stomach; the *superficial*, that arises from the femoral artery; and the *deep* epigastric which arises from the external iliac just as it passes beneath Poupart's ligament to become the femoral. The deep epigastric ascends in the wall of the abdomen and communicates with the superior epigastric.

13. FACIAL—origin, external carotid.

Supplies parts of the face, mouth and fauces. The principal branches of the facial are the tonsillar, muscular, inferior labial, inferior and superior coronary, (to the lips), lateralis nasi, and angular. Through the facial and ophthalmic, the external and internal carotid arteries communicate.

14. FEMORAL—origin, is a continuation of the external iliac.

Supplies some of the organs of generation and lower extremity. Its principal branches are the superficial epigastric, the deep (profunda) femoral, two pudic, muscular, the circumflex iliac, anastomotica magna, and the popliteal, which is only a continuation of the femoral.

15. ILIAC, COMMON—origin, from the aorta.

Internal and external iliacs. These are short vessels—ordinarily three or four inches long. They divide into the internal, and external iliac. They give off some small branches to the psoas muscles and other parts, but these branches have no anatomical names.

16. ILIAC, EXTERNAL—origin, common iliac.

Passes beneath Poupart's ligament and becomes the *femoral* artery. The deep epigastric is an important branch considered in connection with hernia.

17. ILIAC, INTERNAL—origin, common iliac.

Pelvic organs and inner side of the thigh. The internal iliac divides into the anterior and posterior trunks. The middle hemorrhoidal, three vesical (to the bladder), the internal pudic,

sciatic, uterine and vaginal (in the female), and the obturator, are branches of the anterior trunk of the internal iliac. The posterior trunk supplies some of the muscles of the hip.

17. INNOMINATE—origin, arch of aorta.

This is a large but short trunk—one or two inches long—and divides into the right subclavian, and right common carotid. It sometimes sends a branch to the thyroid body; and is sometimes entirely absent.

18. LINGUAL—origin, from external carotid.

To the tongue, sublingual gland, and mouth. The ranine, sublingual, hyoid, and dorsalis linguae are branches of the lingual artery.

19. MAMMARY, INTERNAL—origin, subclavian.

To the walls and structures of the thorax. The internal mammary gives off the superior phrenic, called, also, the comes nervi phrenici (companion of the phrenic nerve), mediastinal (to parts between the lungs), pericardiac, sternal, anterior intercostal, perforating (to the mammary gland and great pectoral muscle), the musculo-phrenic, and superior epigastric. See page 231 of Dutton's Anatomy.

20. MESENTERIC, SUPERIOR—origin, from the aorta.

Supplies the small intestine, cæcum, and ascending and transverse colon.

21. MESENTERIC, INFERIOR—origin, aorta.

Rectum and the lower parts of the colon. The superior hemorrhoidal is a branch of the inferior mesenteric artery. The two mesenteric arteries communicate through the colica media.

22. MAXILLARY, INTERNAL.

One of the terminal branches of the external carotid. It feeds structures indicated by the names of its branches, viz: posterior palatine, vidian, nasal, inferior dental, pterygoid, masseteric, buccal, tympanic, small meningeal, and middle meningeal. It has, in all, fourteen branches.

23. OBTURATOR—origin, internal iliac.

To parts of the pelvis and thigh.

24. OCCIPITAL—origin, external carotid.

Muscles of the neck and back part of the head. Its principal branches are the sterno-mastoid, muscular, meningeal and auricular.

25. OPHTHALMIC—origin, internal carotid.

To the eye and parts adjacent. Its principal branches are the lachrymal, nasal, frontal, ciliary, supra-orbital, ethmoidal, palpebral, and arteria centralis retinæ (central artery of the retina).

26. PALMAR ARCH, DEEP.

Formed by the radial, and deep communicating of the ulnar. It gives off the radialis indicis (to the fore finger), and digital branches to the palm and fingers.

27. PALMAR ARCH, SUPERFICIAL,

Formed by the ulnar artery and the superficialis volæ. It, also, gives off digital branches to the palm and fingers.

28. PHARYNGEAL, ASCENDING—origin, external carotid.

To the neck, throat, and dura mater. It gives off the external pharyngeal and meningeal branches.

29. Two PLANTAR ARTERIES.

Terminal branches of the posterior tibial. They supply the sole of the foot and toes. The external plantar divides into the anterior and posterior perforating.

30. POPLITEAL—origin, continuation of the femoral.

It supplies parts about the knee. It divides into the anterior and posterior tibial. Its principal branches are the articular (to the joint), muscular, cutaneous, and the terminal (two tibial).

31. DEEP FEMORAL (*Profunda femoris*).

Already mentioned, supplies muscles of the thigh.

32. PUDIC, INTERNAL—origin, internal iliac.

Generative organs. Its principal branches are the perineal, inferior hemorrhoidal, the dorsal artery of the penis, and the artery of the corpus cavernosum of the male. In the female the terminal branches supply the clitoris.

33. PULMONARY—origin, right ventricle of the heart.

Supplies the lungs. It divides into right and left pulmonary.

34. RADIAL—origin, brachial.

Fore-arm, wrist and hand. The radial has numerous branches. The radial artery lies on the thumb side of the wrist, and is the one usually felt to ascertain the state of the pulse.

35. SCIATIC—origin, internal iliac.

Muscles of the back of the pelvis. The principal branches of the sciatic are the muscular, vesical, gluteal, articular, and comes

nervi ischiatici (companion of the sciatic nerve). The latter penetrates the sciatic nerve and runs along within it.

36. **SUBCLAVIAN.**

Usually from the innominate artery on the right, and from the arch of the aorta on the left side of the body. It sends blood to the chest, neck, brain, etc., and has four branches, viz: the vertebral, internal mammary, thyroid axis, and superior intercostal.

37. **SUPRASCAPULAR** — origin, thyroid axis.

Muscles of shoulder.

38. **TEMPORAL** — origin, external carotid.

Forehead, ear, parotid gland, and masseter muscle. It divides into the anterior and posterior temporal, to communicate with the frontal and occipital arteries.

39. **THYROID AXIS** — origin, subclavian.

Supplies the shoulder, neck, chest, and spinal cord. It gives off the inferior thyroid, suprascapular, and the transversalis colli (transverse of the neck).

40. The inferior thyroid gives off branches to the larynx, trachea, œsophagus, and thyroid gland.

41. **THYROID, SUPERIOR.**

Branch of the external carotid. It supplies the thyroid gland and the omo-hyoid, sterno-hyoid, and sterno-thyroid muscles.

42. **TIBIAL, ANTERIOR** — origin, popliteal.

Leg, ankle and dorsum of foot. Its principal branches are the recurrent tibial, muscular, malleolar, and dorsalis pedis.

43. **TIBIAL, POSTERIOR** — origin, popliteal.

Leg, heel and sole of the foot. Its principal branches are the peroneal, muscular, nutrient, internal calcanean, and the internal and external plantar.

44. **TRANSVERSALIS COLLI** — origin, thyroid axis.

To muscles of the neck and back. Its branches are the cervical and posterior scapular.

45. **ULNAR** — origin, brachial.

Together with the radial supplies the fore-arm, wrist, and hand. The principal branches are the anterior and posterior ulnar recurrent, anterior and posterior carpal, deep, and digital.

46. **VERTEBRAL** — origin, from the subclavian.

Supplies parts of the neck and brain. The two vertebral ar-

teries enter the skull through the foramen magnum of the occipital bone, and uniting form the basilar artery.

47. The basilar gives off branches to the cerebellum, and divides into the two posterior cerebral arteries. The latter communicate with the middle cerebral arteries by means of the posterior communicating, and thus assist in forming at the base of the brain the circle of Willis. (See pages 230-31. The figures of pages refer to Dutton's Anatomy).

Besides the pulmonary artery, the aorta, the innominate, the cœliac axis, the superior and inferior mesenteric, the three hemorrhoidal, the gastric, hepatic, splenic, the basilar, the colica media, dextra and sinistra (the three colics), and perhaps a few others which are single, the arteries are in pairs, and a description of the artery on one side is supposed to answer for both.

CHEMISTRY.

The modern science of chemistry dates from the discovery of oxygen in 1774. It was born of Alchemy, which comes to us from Arabia—the land of Mahomet. It signifies the hidden art, and was one of the occult sciences. Magic and Astrology were its sister occult sciences. Alchemy claimed to transmute the baser metals into gold and to prepare an elixir by which disease and even death might be avoided; but this claim must be considered as a figure of speech only, which served to convey to the minds of the ignorant the great value of true scientific attainments. Well, Alchemy was beheaded by cutting off the first syllable, which in Arabic signifies “the,” and thus chemistry rose to life.

One author derives chemistry from a Celtic word that signifies “fire,” and it is true that fire is often resorted to in chemical experiments. The true object of chemistry is to discover the secrets of nature in molecular life and apply them for the improvement and happiness of mankind.

Chemistry may be defined as the science of molecular life, i. e., if we allow life to minerals and elements, for chemistry deals with matter on all its planes—mineral, vegetable, and animal. And why should we not allow life to minerals, since there is an invisible force that governs their atoms as truly as the human will governs our voluntary muscles? The property of polarity, and the crystallization of minerals are evidences of mineral life.

Polarity is that property by which the magnetic needle turns to the plane of the meridian; and crystallization is the property by which minerals, in the liquid form, produce a great variety of crystals, each of its own kind. To a thinking mind these properties are evidence of some intelligent force or power which is synonymous with life.

Indeed, there is but one life, though manifest in an infinite variety of forms. Well, Chemistry investigates elemental life; and each distinct kind of matter which cannot be split up into two or more essentially different materials, is called a *simple* substance, or *element*, while all other substances are *compounds*. In all nature the chemist finds only 73 elements; and it may yet appear that all of these are only modifications of one invisible substance out of which all things are made.

The elements are represented in chemistry by symbols. The first letter of the element, written as a capital, is generally used as the symbol of that element. Thus O represents oxygen; C, carbon; N, nitrogen; and H, hydrogen. These four elements are termed essential elements because they are all necessary for the formation of any organic compound whatever. Besides these four essential elements, there are usually found in the human body ten other elements, viz: calcium, chlorine, phosphorus, potassium, iron, fluorine, magnesium, sodium, silicon, and sulphur. Now here we have three different elements commencing with S, two with P, and two with C, besides carbon previously mentioned, so we see we cannot always represent an element by its initial letter. We therefore write with the capital one of the small letters following, *or*, use the initial of its Latin term. Kalium is the Latin for potassium and so K is taken as the symbol for potassium; and Na (for natrium) is the symbol for sodium; Cl represents chlorine; and Ca, calcium. S stands for sulphur, and Si, for silicon. Magnesium, because another element begins with Ma (manganese), is written Mg. P stands for phosphorus, F for fluorine, and Fe (Ferrum), for iron. Ferrum is the Latin term for iron.

Besides the fourteen elements usually found in the human body, there are about eighteen more that the student in chemistry should be familiar with. The following are their names and symbols, viz: Br. (bromine), I. (iodine), As. (arsenic), Sb. (antimony, Latin stibium), B. (boron), Zn. (zinc), Pb. (lead, Latin plumbum), Cu. (copper, Latin cuprum), Ag. (silver, Latin argentum), Hg. (mercury, Latin hydrargyrum), Al. (aluminum), Mn. (manganese), Co. (cobalt), Ni. (nickel), Sn. (tin, Latin stannum), Bi. (bismuth), Au. (gold, Latin aurum), Pt. (platinum). The remaining forty-one elements are comparatively unimportant, and are here omitted

for that reason. Two of the elements—Bromine and Mercury—are liquid at ordinary temperature; four of them—oxygen, hydrogen, nitrogen and chlorine,—and probably also fluorine, are gases; the rest are solids. (Gases are compressible fluids, while liquids are practically incompressible). Fluorine has such strong affinity for other substances that it cannot be obtained free. It is found combined with calcium—as fluoride of calcium—in the enamel of the teeth, and in bones. Its principal compound is hydrofluoric acid (written chemically HF) which is a permanently elastic fluid like air (gaseous) and which when dissolved in water gives us a colorless, very corrosive liquid, used for etching glass.

We have spoken of molecular life, or the life of molecules (little masses of matter). A molecule is the smallest quantity of any substance that can exist in a free state; *i. e.*, the smallest quantity of any substance that can be taken or used as such. To divide a molecule of any substance is to change or destroy the peculiar nature of that substance. A molecule of sugar is sweet, but the separate atoms composing the molecule are not sweet.

The molecule is supposed to be composed of atoms, though nobody has ever seen an atom (the ultimate unit of an element). The molecule is a real thing; the atom is something conceived only.

Atom signifies “uncut” or undivided; and all matter is supposed by chemists to be made up of minute particles, or atoms, which are indivisible. All the atoms of any one element are alike; but the atoms of different elements are *unlike*. A molecule can be divided (split up into its atoms) by chemical but not by mechanical means. As we reckon seventy-three elements in nature, so we have seventy-three different kinds of atoms. The actual weight of an atom nobody knows, but only the relative weight.

The relative weight of an atom of hydrogen (the lightest of all known substances) is taken as the standard for the weight of all other atoms. Oxygen is sixteen times as heavy as hydrogen, or about that (15.96), and so the weight (the relative weight) of oxygen is put down in chemical formulas as 16. Carbon is nearly twelve (11.97) times as heavy as hydrogen, and so the atomic weight of carbon is 12; nitrogen 14 (14.01); chlorine 35 (35.37); sodium 23 (22.99); sulphur 32 (31.98), etc.

As a science chemistry is not exact, like mathematics, and the Atomic theory may ultimately prove to be erroneous. The atomic weight of an element is also called the *combining number* of that element, because an atom being supposed to be indivisible, the proportion of any one element in a given molecule, or compound, will always be the weight of one or more atoms; in other words it will be the weight of one atom, or a multiple of that weight. The number of atoms taken of each element in any chemical formula is represented by a small figure placed a little below and just after the symbol of the element; thus H_2O is the formula for water, and represents that two atoms of hydrogen are combined with one atom of oxygen.

The approximate atomic weight of any atom of oxygen being 16, and the weight of hydrogen 1, two atoms of hydrogen and one of oxygen united make 18, which is said to be the weight of a molecule of water. A molecule of hydrogen is said to contain two atoms. The heavy irrespirable and poisonous gas (carbon dioxide, or carbonic acid gas), which we are constantly exhaling in our breath, is composed of one atom of carbon and two atoms of oxygen, and is represented by the chemical formula CO_2 .

Ca is the symbol for an atom of calcium, and CaO is the formula for a molecule of quicklime. It shows that one atom of calcium was combined with one atom of oxygen to form quicklime.

To find the absolute weight of any atom by its atomic weight we should need to know the absolute weight of an atom of hydrogen, for the atomic weight is only the relative weight as compared with an atom of hydrogen. A *molecule* of hydrogen is supposed to be composed of *two atoms*, because hydrogen unites with *half* its volume of oxygen, to form water; and equal volumes of gases under like conditions are supposed to contain an equal number of molecules; *i. e.*, it always takes two atoms of hydrogen, or two volumes, to unite with one volume of oxygen.

There are no permanent gases. All gases can be reduced to liquids, and even to solids by pressure at low temperature.

All bodies in chemistry are either simple or compound. A *simple* body is an element; one that cannot be separated into two or more different substances. A known compound *can* be separated into two or more different substances, or elements. A compound, or molecule, composed of only *two* elements is a binary mole-

cule; of three, a ternary molecule. A molecule of any substance has all the qualities of the substance itself. HF (Hydrofluoric acid) is a *binary* molecule.

Matter is elementary when composed of like atoms, and compound when made up of dissimilar atoms. That any kind or quantity of matter, even an atom, is absolutely *indivisible* is quite unlikely; indeed the divisibility of matter is one of its essential properties, and one which distinguishes it from spirit which is indivisible; but spirit is indivisible not because of its minuteness but because of its essential unity and universality. To destroy the unity of spirit is to destroy its spirituality. To push matter beyond the limit of divisibility is to push it into the realm of spirit and beyond the bounds of matter. A fraction is divided in arithmetic by multiplying its denominator; and, the longer we thus divide, the larger the denominator becomes. In this way there is absolutely *no limit* to the divisibility of a fraction; but the numerator, which is a unit when we begin, remains a unit forever, or so long as we continue the process. So matter may likely be divided indefinitely so long as it remains matter.

The Atomic theory, on which chemistry is now based, is ingenious and convenient, though hardly consistent with philosophy; but until we have something better in its place we must continue to use it.

When oxygen (acid generator) was named, it was supposed to be necessary to the formation of an acid; now we know at least two acids—hydrochloric, and hydrofluoric—that contain no oxygen; and the term “acid” has so far lost its distinctive character as to be almost discarded in science.

Most of the acids are soluble in water, have a sour taste, and redden blue litmus paper, but silicic acid has none of these properties. Oleic acid does not redden litmus. Palmitic and stearic acids are both insoluble in water. Uric acid is so nearly insoluble in water as to require 15,000 times its bulk of water for solution.

“Salt” is another term loosely used in chemistry and has no technical meaning. It is defined by some authors as the union of a base with an acid; but common salt (NaCl) is composed of sodium and chlorine, neither of which is an acid. Sodium is a metal, and chlorine is a greenish-yellow, poisonous gas.

Alkalies and acids react on litmus paper. Acids as a rule turn

blue litmus paper, and litmus solutions, *red*; and alkalies turn them back to blue again; and this is what is meant in chemistry by reaction. If a substance does not *react* on litmus it is said to be *neutral*. Potash, soda, and ammonia are strong alkalies. They convert fats to soap.

An *oxide* is a combination of oxygen with some other element. The metallic oxides are an important class of bodies. Iron-rust is an oxide of iron; quicklime, an oxide of calcium.

A *sulphide* is a compound of sulphur with some other element. The *sulphide* of calcium (CaS), when pure, is a union of sulphur and calcium. The sulphide of calcium used as a medicine to prevent the formation of pus, boils, and abscesses, is not strictly a sulphide of calcium, but a mixture of sulphide and sulphate and is often called "sulphide of lime," or "sulphurated lime." It is a gray powder.

A *chloride* is a compound of chlorine with some other substance. The chloride of calcium, pure, has the formula, CaCl_2 ; but the chloride of lime, known as "bleaching powder," or "chlorinated lime," is of uncertain formula, and is used in medicine as a disinfectant. Lime (CaO) is an oxide of calcium.

An *iodide* is a compound of iodine with some other substance. Iodide of potassium (KI) has formerly been considerably used—as an alterative—in medicine. (An alterative is supposed to produce some change). K (kalium) stands for potassium.

A *base* in chemistry is a leading or basic constituent in many chemical compounds, and usually consists of some oxide, alkali, or metal. Perhaps the best definition is this: "A *base* is a substance which replaces the hydrogen of an acid and thus forms a salt."

A *salt* is defined as an acid in which the hydrogen has been partly or entirely replaced by a metal or metals. An *anhydride* (dry) is an oxide which will unite with water to form an acid.

A *nitrate* is a salt formed by the union of *nitric* acid with a base. The direct union of two elements forms "ide" salts. Acids ending in "ous" unite with bases to form "ite" salts. Acids ending in "ic" unite with bases to form "ate" salts. Nitrate of silver has the formula, AgNO_3 . Ag (argentum) represents the silver, and NO_3 , the nitric acid. N stands for nitrogen, and O_3 for three atoms of oxygen. The *silver nitrate* (more modern expression for nitrate of silver), when melted and cast in sticks, goes by the name

of *lunar caustic*. A *nitrite* is a salt formed by the union of *nitrous* acid with a base ; a *sulphite* is a salt consisting of *sulphurous* acid and a base. The *ons* acid which forms *nitrites* is weaker in oxygen than the *ic* acid that forms *nitrates*.

A *hydrate* (from a Greek word signifying *water*) is, according to Brande, a compound formed by the union of water with a metallic oxide ; and according to Witthaus is a substance derived from water by the substitution of an element, or radical, for one half its hydrogen. Acids and alkalies are called hydrates (Prof. Cooke).

A *compound radical* is a compound which acts like an *elementary* body, forming the base of other compounds. *Ammonium* is a compound radical. There is no such element or metal known as ammonium. It is a *quasi*-metal and has the formula, NH_4 , but is treated as a metal. It is a compound, but as a metal is purely hypothetical.

Chemical phenomena are usually divided into two groups called inorganic, and organic chemistry. The latter considers only organized beings—animals and plants.

The various operations of chemistry consist largely of *analysis* and *synthesis*; the splitting up of compounds into their elements, and the combining of elements, or radicals, to form compounds. Heat, light, and electricity, are the usual means employed to bring about composition and decomposition in the chemical laboratory. The special attraction that one atom, or element, has for another, or one compound for another, is known as *chemical affinity*. It might perhaps be considered spiritual energy. Chemical union always evolves heat.

Air, water, and the diamond, contain the four essential elements that enter into the composition of all organic forms. Air contains nitrogen and oxygen ; water oxygen and hydrogen ; and the diamond is almost pure carbon.

Water is the standard weight for solids, as hydrogen is for gases.

Gold is 19.3 heavier than water ; and the relative weight is what we mean by *specific gravity*. It is the weight as compared with water. The specific gravity of gold is 19.3. The specific gravity of the diamond is 3.3, and sometimes 3.5, because it is about three and one half times heavier than water. Water freezes at a temperature which is marked 0 on the centigrade thermometer, and 32° on the scale of Fahrenheit ; and boils at 100° Centigrade, or 212° Fah.

Water is most dense at the temperature of 4° Centigrade, or 39° Fah. A cubic centimeter of water (a cube whose side is about $\frac{2}{5}$ of an inch) at its greatest density, weighed in a vacuum (so as to get its absolute weight) weighs one gramme (about 15½ grains), and 1000 grams (a kilogram) of water makes a litre. The litre contains 2.1135 pints; nearly 6 per cent more than an American quart. A litre is a cube of water whose side is $\frac{1}{10}$ of a metre, or one decimetre. The metre is 39.37 inches—nearly 40 in. It is one ten-millionth of the distance from the equator of the earth to either pole.

In cooling below 4° (39° Fah.) water *increases* in volume and at 0 (32° Fah.) freezes and floats as ice. Above 100° C. (212° Fah.) water turns to steam. Steam is transparent and invisible. The formula for water, ice, and steam (since they are all composed of the same elements) is H_2O (two atoms of hydrogen in combination with one atom of oxygen). Hydrogen and oxygen form one other compound besides water. It is H_2O_2 (hydrogen dioxide) a liquid of syrupy consistence. It has been used as a test for blood stains. With freshly prepared tincture of guaiacum and blood it strikes a blue color. With other bodies water unites to form hydrates. CaO is lime (oxide of calcium), and H_2O is water. These unite, when put together, as when water is poured upon quicklime (CaO), and form hydrate of lime ($CaO + H_2O = CaOH_2O$, or again CaH_2O_2). Here we have one molecule of water (H_2O) combined with one molecule of lime (CaO) to form hydrate of lime. *Water of crystallization* is the water necessary to hold certain salts in crystalline form, and when the water is driven off by heat the salt falls into a powder. Salts which absorb water from the atmosphere are *deliquescent* salts—as acetate of potash; and those that lose water — like phosphate of soda — are *efflorescent*. A salt which undergoes no change is a *permanent* salt.

Oxygen is a colorless and odorless gas like the atmosphere, but a little heavier, its specific gravity being 1.1056 while that of the air is 1. Oxygen is the great supporter of combustion and of animal life. It is necessary to respiration, germination, and equally to decay or putrefaction. These processes cannot go on without it. It forms about $\frac{1}{5}$ of the air, $\frac{8}{9}$ of all the water on the globe, and nearly $\frac{1}{2}$ of the solid earth. Ozone is only another term for condensed oxygen. It has the formula O_3O which only shows that three volumes, or three atoms of oxygen are condensed into two. Ozone

is the safest and best disinfectant of the air, and is developed by electric sparks (lightning) passing through air, or by allowing a stick of phosphorus to hang in a bottle filled with moist air, and also by the action of strong sulphuric acid upon permanganate of potash, or barium peroxide. The atmosphere contains more ozone just after a thunderstorm. Oxygen is set free by the action of sun-light upon the leaves of plants.

Hydrogen is a colorless and odorless gas, but very much lighter than air, its specific gravity being only .069. It forms $\frac{1}{9}$, by weight, of water. If you wish to pour it from one vessel to another, the receiving vessel must be inverted (bottom upwards). By great pressure and cold it is reduced to a steel-blue fluid resembling mercury. Hydrogen is used for inflating balloons, and can be prepared by the action of zinc or iron, on sulphuric, or hydrochloric, acid.

Nitrogen is also a colorless and odorless gas, with a specific gravity of .97, being slightly lighter than air. It is not combustible nor a supporter of combustion. No animal can live in it if deprived of oxygen. It forms nearly $\frac{4}{5}$ of the air, by bulk, and is found in all organic substances. Nitrogen unites with hydrogen to form *ammonia* (NH_3). Ammonia, also called "hartshorn," is an irrespirable gas. It is very soluble in water, forming "aqua ammonia" (water of ammonia). In a similar way it forms spirit of ammonia. It is an alkali, turning reddened litmus paper blue again. On this account 'tis said to have an alkaline reaction. It is found in the horns and hides of animals, but is now largely prepared from the ammoniacal liquor of gas works.

Nitrogen with oxygen forms several compounds, but only two of them are important—"laughing gas," and nitric acid. The latter has three elements—thus: HNO_3 ; but the base of nitric acid is the nitric anhydride (N_2O_5) which is a compound of nitrogen and oxygen. By adding water to the nitric anhydride, which is, as you see by the formula, an oxide of nitrogen, we get nitric acid, as follows, viz: $\text{N}_2\text{O}_5 + \text{H}_2\text{O} = \text{H}_2\text{N}_2\text{O}_6$; or by dividing by 2, because there are two atoms of each element, or a multiple of two, we have HNO_3 , which is the formula for *nitric acid*—a fuming corrosive liquid, called "aqua fortis" (strong water). It is colorless when pure, but usually slightly yellow from the presence of other oxides of nitrogen. It is liable to contain sulphuric acid and chlorine.

Nitric acid alone is extremely corrosive and soon eats up the

cork of a bottle in which it is kept. It is commonly kept in glass stoppered bottles. It stains the skin yellow. It is sometimes used for destroying excrescences, but must be handled with care. Mixed with hydrochloric acid it forms the famous "*Aqua Regia*" (royal water) that dissolves gold. The proportions as lately prepared are four parts nitric, to fifteen of the hydrochloric, acid. Nitric acid alone does not attack gold, or platinum, and is used for testing gold by jewellers.

The dilute aqua regia has been given as a medicine in liver complaints. It is technically called nitro-muriatic, or nitro-hydrochloric acid. 5 drops of the *dilute* acid is given in a wineglass of water, and taken through a straw, or glass tube, to prevent injury of the teeth. It is a very searching remedy.

Nitric acid forms various salts called *nitrates*. *They are all soluble in water* (H_2O).

Laughing gas (N_2O) is the nitrous oxide. Its specific gravity is about the same as that of carbon dioxide (CO_2) ; one half heavier than atmospheric air, or, more exactly, 1.52.

Carbon exists in three forms. 1. The diamond. 2. Graphite, plumbago, or black lead, which is used for making lead pencils, so-called, although they contain no lead, but only carbon. 3. Amorphous (shapeless) carbon, the product of incomplete, or smothered combustion. This form of carbon has several varieties, viz : soot or lampblack, which is only finely divided charcoal ; animal coal or boneblack ; bituminous or soft coal ; cannel-coal (a hard coal that burns with a bright flame) ; coke (the residue of the gas-works) ; gas carbon (deposited in gas retorts and used in galvanic batteries) ; common charcoal ; and anthracite (hard mineral coal). The specific gravity of each form of carbon differs from the others : that of the diamond which is most dense is about 3.5 : that of black-lead (graphite) is 2.18 to 2.38 ; and that of charcoal 1.6 to 2. Charcoal floats upon water only by reason of its porosity. If reduced to a powder it sinks.

The *diamond* is insoluble in all media, and infusible, but is destroyed by great heat. It is used for ornaments, and for cutting glass.

Carbon forms two compounds with oxygen, viz : CO (carbon monoxide) and CO_2 (carbon dioxide). The former is produced when carbon burns with a limited supply of oxygen. It is a color-

less gas, but burns with a lambent blue flame and may be seen coming off from the top of the coal in coal stoves soon after fresh coal has been added to the fire. It is a strong poison when inhaled, and fatal effects have often been observed of the fumes from burning charcoal or from limekilns. The latter (CO_2) is the principal waste product from our lungs. It is also given off in the processes of fermentation, combustion, germination, putrefaction, and decay of organic substances. It is injurious to man when inhaled but useful to plants. It is the "coke-damp" of mines. It is heavier (sp. gr. 1.529) than common air and accumulates at the bottom of wells and pits where it is sometimes fatal to life. It is, as we believe, the principal material agent in the production and fatality of pulmonary consumption. Being *heavier* than common air it must be carried from our rooms by registers or flues opening near the floor of the room, at the bottom of low windows, or by aid of a forcible draft. This CO_2 is the product of oxidation of the hydrocarbons in the body, and is held in solution in the plasma of the venous blood till it reaches the lungs, where in good health it is eliminated. The atmosphere usually contains about .04 of one per cent. of this gas, *i. e.*, four parts of gas to ten thousand parts of air (4 to 10,000).

Asphyxia (suspended animation) is the result of an excess of this gas in the blood. Six per cent. of this gas in the air of a room will cause asphyxia, and 12 per cent. will extinguish a candle. The candle will burn dimly in an atmosphere where man cannot live. Pure carbon dioxide, when inhaled, produces at first spasm of the glottis. Ten per cent. of this gas in the air is rapidly fatal.

The compounds of carbon with hydrogen are numerous. CH_4 is the "marsh gas." It is known in coal mines as "*Fire-damp*." It becomes explosive when mixed with ten times its volume of air or twice its volume of oxygen. Coal *gas for illuminating purposes* is procured by heating the coal in closed retorts.

The volatile bodies, ammonia water, tar and gas, are driven off, leaving a residue of impure carbon, called coke. From the coal tar the analine colors are produced, and the ammonia water is the chief source of ammoniacal salts. The gas itself is not a simple chemical compound but a mixture of various substances called hydrocarbons, luminous and non-luminous, some of which are withdrawn by a system of purification. The non-luminous gases from coal are H

(hydrogen), CO (carbon monoxide), and CH_4 (*fire-damp*, or marsh gas).

Flame is gas highly ignited. Luminosity depends upon the presence of solid matter heated to whiteness.

Carbon with nitrogen forms cyanogen (CN), a poisonous gas with the odor of peach blossoms.

An atom of hydrogen added to cyanogen forms hydrocyanic, or Prussic acid (HCN). It is a volatile liquid with a specific gravity of .7 (.700). A small quantity inhaled produces giddiness and headache, and a single drop on the tongue of a dog is quickly fatal. The dilute acid of the British Pharmacopœia contains 2% of the poison. Chlorine, bromine, iodine and fluorine have been termed "Halogens" (salt producers).

Chlorine (Cl) is a greenish yellow poisonous gas, and is one of the elements of common salt. With hydrogen it forms hydrochloric acid (HCl), called also muriatic acid.

Bromine is a reddish brown liquid and emits an irritating poisonous vapor.

Iodine is a dark gray solid, with metallic lustre. It is obtained from the ashes of sea weeds, and is used in medicine as an alterative discutient, and in the form of iodide of potassium, to eliminate lead and other metals from the system. It is generally given in the form of iodides. It is an irritant poison, and when given in small medicinal doses for some length of time produces coryza, inflammation of the eyes, frontal headache, and an eruption of the skin which is sometimes mistaken for the effects of syphilis. Fluorine has been already mentioned.

Sulphur is a hard and brittle, light, yellow solid; of a faint peculiar odor. It is commonly called brimstone. It is found combined with various metals, forming sulphides, and free in certain volcanic countries, especially Sicily and Iceland. Galena (an ore of lead) is the sulphide of lead. Gypsum (Plaster of Paris) is a sulphate of calcium. Iron pyrites (FeS_2) contains two atoms of sulphur combined with one of iron. Glauber's Salts are sulphate of soda, and Epsom Salts, sulphate of Magnesium. Flowers of sulphur is the powder formed by the vapor of sulphur when it solidifies. Sulphur is soluble in disulphide of carbon, and, sparingly, in fixed and volatile oils.

Carbon Disulphide is a volatile liquid with an odor of cabbage

water, possessing an acid, pungent taste, and is very inflammable. It dissolves sulphur, caoutchouc, many resins, gums, fats, etc. Written also "Bisulphide." SO_2 (sulphur dioxide), with water, forms sulphurous acid, largely used for bleaching purposes. The dioxide, which can be condensed to a liquid, is employed to put out fires. SO_3 (sulphur trioxide) forms, with water, sulphuric acid; thus $\text{SO}_3 + \text{H}_2\text{O} = \text{H}_2\text{SO}_4$. (In combining formulae we write the letters and sum up the exponents, or atoms, of each). Sulphuric acid is a heavy, oily liquid, and is often called "Oil of Vitriol." It quickly burns or chars organic bodies, and is one of the most powerful acids known. Mixed with water it gives out heat.

H_2S (sulphuretted hydrogen) is a colorless gas having the odor of rotten eggs. It is produced by the decomposition or fermentation of albuminous food and helps to constitute the flatus of the bowels. It is found in sewer gas, and when breathed gives rise to headaches and typhoid fever. It acts as a poison in the blood, destroying the blood globules.

Phosphorous is a waxlike solid which exists in two states or forms, yellow and red. The yellow modification is luminous in the dark, and more poisonous than the red. It has a strong affinity for oxygen, and for that reason is kept under water. Is used in making matches. The operators are more or less poisoned by breathing its fumes, and have, as a result of poisoning, necrosis of the jaw. It is a violent poison, and has been used to kill rats; and in medical practice as a stimulant to the nerves. Of course all such stimulants are dangerous.

Arsenic. This is another deadly poison that has been much used in regular practice. One of its compounds, Arsine, is a gas, and so deadly that its discoverer, Gehlen, was killed by inhaling a single bubble of the gas. Two grains of arsenic (or arsenious acid) is considered a fatal dose. *Orpiment*, or King's yellow, is a combination of sulphur and arsenic. Scheele's green and Paris green are compounds of arsenious acid and copper.

Fowler's Solution is a common form for giving arsenic to patients. Arsenic is used as coloring matter in various prints and wall paper. The chemical antidote for arsenic is *magnesio-ferric hydrate*, every ten minutes in tablespoonful doses. Also raw eggs and milk.

Antimony is a tin-white heavy metal. *Tartar emetic* is a

tartrate of antimony and potassium, and is well known in the profession as an emetic. Not so much used now as formerly.

Boron is a greenish-brown solid body or element. Combined with oxygen and sodium it is known as *borax*, which is used in the arts. The principal boron compound of medical interest is boric acid (H_3BO_3) which is a valuable antiseptic. The latter is soluble in 25 parts of water.

Silicon is an elementary solid. It is used in making glass which is a silicate.

Potassium is a waxy bluish-white metal, having a very strong affinity for oxygen. If thrown on water it decomposes the water, setting fire to the hydrogen which it liberates. It is found in minerals and plants. When obtained by evaporating the lye of wood ashes it is called *potash*, or pearly. It is one of the alkali metals, and is grouped with sodium, lithium, and the compound radical known as ammonium. Its symbol is K (kalium). Potassium hydrate is known as *caustic potash*, (KOH). The latter belongs to a class of poisons known as alkaline caustics. They dissolve and destroy the tissues. The best antidote for alkaline caustics are mild vegetable acids, milk, or oils.

Potassium cyanide is a very poisonous compound much used in photography for *dissolving* the unaltered silver salts, and also for cleaning the hands from nitrate of silver stains.

Potassium chlorate is a poisonous salt used to make oxygen, and also as a gargle. It is often found in the kidneys after death.

Potassium nitrate is known as nitre, or saltpetre. It is used in the manufacture of gunpowder, and also as a diuretic and refrigerant in rheumatism and fevers. The books say it is poisonous in over doses, but we submit that its character is the same in small doses as large and that its injury will be proportionate.

Potassium permanganate forms, when dissolved in water, Condy's fluid. A single grain of the crystals imparts to a goblet of water a beautiful purple color. It is a disinfectant.

Potassium oxalate resembles Epsom Salts in appearance and is liable to be mistaken for it. It is very poisonous. It is known as *salt of lemon*, or salt of sorrel. Beware of it.

Cream of tartar is an impure potassium tartrate, deposited in the casks during the fermentation of wine made from grapes. It is

used as a diuretic and purgative in fevers, rheumatism and dropsies, in doses of 20 to 120 grains.

Sodium is a silvery-white metallic element. Like potassium it has a strong affinity for oxygen and has to be preserved like potassium under some hydrocarbon like wood-naptha. It is abundant, as a chloride, in rock salt, sea water and saline springs. Symbol Na (natrium). Chloride of sodium (NaCl) is common salt. Taken into the system it shrivels the blood corpuscles, hardens the tissues and interferes with the process of endosmosis and exosmosis. A saline fluid will not pass so readily through an animal membrane as fresh water. This is easily shown by experiment.

The two principal carbonates of sodium are *sal soda*, or washing soda (Na_2CO_3), also called sodium carbonate; and the sodium bicarbonate (NaHCO_3). The latter enters into the preparation of soda powders and also of Seidlitz powders. The soda powders are mixed with cream of tartar, or tartaric acid, and used as "baking powder, to raise bread."

Lithium is the lightest metal known (sp. gr. .59). It is found in the waters of some mineral springs. Lithium salts and Lithia water are used in medicine to *dissolve uric acid*. They change the insoluble uric acid into soluble lithium nitrate. The citrate, and salicylate of lithium are preferred as medicines on account of their greater solubility. Dose of either, 1 to 5 grains.

Calcium is a light yellow metal. Its specific gravity is 1.58. It is abundant chiefly as the *carbonate* which forms coral, limestone, marble and chalk. When heated in the air calcium burns with a bright light. With oxygen it forms lime (CaO). Pure lime is called *quicklime*, or *caustic lime*. Quicklime combines with water readily and forms what is known as *slaked lime* which is mixed with sand in making mortar.

Calcium carbonate exists in crystalline form as *Iceland spar*. Hard water deposits calcium carbonate on boiling.

Calcium sulphate combined with water forms gypsum. Powdered and mixed with water gypsum forms plaster of Paris, much used by dentists and others for making casts and moulds.

Fluor Spar is calcium fluoride.

Calx sulphurata, commonly called calcium sulphide is a mixture of calcium sulphide and calcium sulphate, and is used in medi-

cine to cause boils to abort, and prevent the formation of pus and abscesses. Dose $\frac{1}{10}$, to one grain, three times per day.

Magnesium is a silver white metal, and is one of the elements of Epsom salts (magnesium sulphate).

Zinc is a bluish-white metal. Zinc oxide (ZnO) is largely used for painting white.

Zinc chloride ($ZnCl$) is a painful caustic.

Zinc sulphate ($ZnSO_4$) is commonly known as white vitriol.

Lead (*Plumbum*) is one of the heavy metals. Its specific gravity is 11.37. Lead and tin together form *soft solder*, used by tinmen. Lead and antimony together make *type-metal*. The principal source of lead is a native lead sulphide called, Galena. Lead is much used for water pipes but is always more or less a source of poisoning. Lead chromate is *chrome yellow*. It is a deadly poison. Lead acetate (sugar of lead) has been used in medicine as an astringent and sedative, and in hair restorers. It is always poisonous. It enters into the formation of Goulard's extract, and may be used as an external application in ivy poisoning when largely diluted. Lead carbonate is used in oil paints, by plumbers to form joints of water pipes, for glazing paper, etc. It is the most poisonous of the lead compounds. The principal symptoms of lead poisoning are colic pain, obstinate constipation, palsy, usually of the forearm and called *wrist-drop*, blue line on the gums, foul breath, convulsions, coma and death. Antidotes—Epsom salts and lemonade, to produce an insoluble lead sulphate.

Copper occurs in the metallic state and in ores. The principal alloys of copper are brass (copper and zinc), bronze (copper and tin, or lead), and German silver (copper, zinc and nickel). Scheele's green, and Paris green are compounds of copper and arsenic. The copper of commerce is rarely free from arsenic. The *solder* with which copper vessels are usually made may prove a source of poisoning in copper cooking utensils. Food standing in copper vessels may generate poisonous products. The symptoms of copper poisoning are vomiting and purging, metallic taste in the mouth, colic pains, suppression of urine and jaundice. Best antidotes are raw eggs and milk. Pickles, peas, and sweetmeats are sometimes colored with poisonous copper salts.

Mercury (*Hydrargyrum*) is a metallic liquid with a sp. gr. of

13.6. It sometimes occurs in the native state, but its chief ore is *cinnabar* (mercuric sulphide) which is found in Spain, California and China.

The two chlorides of mercury are *calomel*, and *corrosive sublimate*. Calomel contains one atom of chlorine with one of mercury, while corrosive sublimate has *two* atoms of chlorine to one of mercury. One is the chloride, and the other the bichloride. Calomel may be converted into corrosive sublimate by the simple addition of more chlorine, which is abundant in common salt. Corrosive sublimate is a violent corrosive poison, and is used, largely diluted, as an antiseptic, and parasiticide (parasite-killer). 3 grains taken internally may prove fatal. The antidote is raw eggs. Mercury as a medicinal agent produces salivation, fetid breath, anaemia, inflamed germs and canker sores.

Silver (*argentum*) is a white brilliant metal with a sp. gr. of 10.5. It forms alloys with other metals and is employed as coin, alloyed with copper. The English coinage contains 7.5 per cent. of copper. The principal salt of silver used in medicine is the silver nitrate (Ag. NO_3) or *lunar caustic*. When taken internally it is a corrosive poison and produces indelible stains of the skin. It makes an indelible ink for marking linen. The antidotes for lunar caustic are common table salt and raw eggs.

Aluminum is a valuable silver-white metal, very light, very ductile, and does not tarnish in the air. It is abundant in clay, marl, slate, and in many crystalline minerals. Combined with oxygen (forming an oxide of aluminum) it forms the *ruby*, *sapphire* and *corundum*. The aluminum sulphate with the alkaline sulphates forms alums. The alum of the Pharmacopoeia is now a potassium alum. (Ammonium alum was formerly used.) The potassium alum when calcined forms "burnt alum." The latter is a powerful astringent and escharotic. It is employed to suppress fungoid granulations and to check hemorrhage.

Iron is the most useful of all the metals. It is obtained mostly from iron ores, pure metallic iron being confined almost wholly to meteoric stones. The iron of commerce exists in three forms: *cast iron*, *wrought iron* and *steel*. Cast iron is granular in structure; wrought iron, fibrous. Cast iron contains from 3 to 6 per cent. of carbon; the other kinds less than 2 per cent. Long continued vibra-

tion reduces fibrous iron to its original crystalline condition; and many accidents of breaking axles occur on account of this change. Steel is refined iron; and is made by burning out the carbon and silicon in cast iron by passing through the molten metal a blast of air till the iron is pure, and then adding a small percentage of carbon and manganese.

[This process makes *Bessemer* steel.] Magnesio-Ferric hydrate, called also hydrated oxide of iron with magnesia, is the chemical antidote, when freshly prepared, for arsenic. It can be quickly prepared by mixing the two following solutions kept for this purpose.

1st. Two ounces solution of tersulphate of iron in six ounces of water, and kept in a five-pint bottle.

2nd. *Magnesia milk*, made by rubbing up 150 grains of light calcined magnesia with eight ounces of water.

When wanted shake well the magnesia milk and pour into solution No. 1. Shake all together and give a tablespoonful every five to ten minutes.

Nickel is a silver-white metal used in alloys, and as a coating to steel and iron instruments to prevent them from rusting, because nickel does not readily tarnish in the air.

Tin (stannum) is another silver-white metal. As a metal it is not poisonous, but its soluble compounds are irritant poisons. Best antidotes for tin are milk and eggs.

Bismuth is a reddish-white metal. With nitric acid it forms two nitrates—bismuth nitrate, and bismuth sub-nitrate. Its different preparations have been given in dyspepsia. It is generally more or less contaminated with arsenic.

Gold (aurum) is a soft yellow metal with a sp. gr. of 19.3. The chloride of gold has occasionally been given in neuroses (disease of the nerves). A proper state of the will is a better remedy for dipsomania. When a person once *makes up his mind* that alcohol or other substance is bad for him he ceases to want it.

Platinum is a rare metal of greyish-white color, untouched by all acids except a mixture of nitric and hydrochloric, known as *Aqua regia*, which also dissolves gold.

We are not aware that platinum is ever prescribed as a remedy for disease. It is a rare and expensive metal.

Carbohydrates are compounds of water and carbon in which water is a prominent part; *i. e.*, carbon united with hydrogen and oxygen in right proportion to form water: viz., two atoms of hydrogen to one of oxygen. Their *general* chemical formula is $C_mH_{2n}O_n$; in which you see there is always just twice as many atoms of H as of O. The "m" and "n" stand for unknown quantities. The carbohydrates contain all the essential elements except nitrogen (N). They include starch (*Amylum*) and sugar (Latin, *Saccharum*; French, *Sucre*).

There are two distinct kinds of sugar and several varieties. The two kinds are cane sugar and grape sugar. They are also known as *sucrose* and *glucose*. Grape sugar is a glucose ($C_6H_{12}O_6$). The formula for cane sugar (sucrose) is $C_{12}H_{22}O_{11}$, and consists of two molecules of glucose with the elimination of one molecule of water (H_2O). If we double the molecule of glucose we have $C_{12}H_{24}O_{12}$, and by taking away one molecule of water (H_2O) we have left $C_{12}H_{22}O_{11}$ (sucrose or cane sugar). Cane sugar is made from sugar cane, the maple tree (sugar or rock maple), and the beet root. Grape sugar (glucose) is found in raisins, honey and manna, and is also manufactured by boiling starch with dilute sulphuric acid. The artificial glucose is liable to be impregnated with sulphuric acid or lime. Cane sugar changes to glucose before it undergoes fermentation.

Artificial glucose is used as a substitute for syrup at the table. It looks to be very nice but the taste is sharp and acrid.

A *glucoside* is a substance which is converted into glucose by boiling with acids.

The carbohydrates form an important class of foods for supplying muscular force and animal heat. They are not supposed to nourish the tissues of the body because they contain no nitrogen; are *non-nitrogenous*.

Milk sugar is sometimes called *lactose*, because derived from milk (lac).

Cellulose and glycogen have the same chemical formula as starch ($C_6H_{10}O_5$). *Cellulose* is the substance that makes up the *woody fibre* of plants and trees, and is indigestible because insoluble. Cotton is almost pure cellulose.

Gun cotton is produced by the action of nitric and sulphuric

acid on cellulose. It is highly explosive by percussion. Dissolved in ether and alcohol it forms *collodion*. By dissolving camphor in collodion and evaporating the ether we get *celluloid*, which is hard at an ordinary temperature but plastic when warm.

Glycogen (sugar maker) is a kind of animal starch found in the liver, in oysters, and in embryonic structures.

Wheat flour contains about 70 per cent. of starch and 10 per cent. of gluten. The outer surface of the grain is cellulose. Starch is insoluble in cold water, and requires cooking for nearly three hours to make it digestible.

Hydrocarbons are compounds composed mainly of hydrogen and carbon. They include oils and fats, and a multitude of other inflammable bodies like gas, rock oil, etc. Fats in the body are derived not only from fats ingested, but from carbohydrates and proteids. The cow eats no fat but produces butter.

Petroleum, or rock oil, is a mixture of various hydrocarbons. Kerosene, paraffine, benzine, naphtha, gasolin and cosmoline, are some of its components. Cosmoline is also known as vaseline and petrolatum.

Marsh gas is a hydrocarbon, and is known as the "fire-damp" of mines; also as light carburetted hydrogen or methane. It is a colorless and tasteless gas. Its presence in the mines is announced by the safety lamp which is perfectly shut in by wire gauze. The gas, when present, burns inside the gauze with a blue flame, but the gauze cools the heat and prevents the fire-damp from becoming ignited.

Paraffine (small affinity) is a white, tasteless, inodorous, solid hydrocarbon used in the manufacture of candles, and for coating corks and bottle stoppers to prevent the action of corrosive fluids. Fats and oils are mixtures of palmitic or margaric, stearic and oleic acids, united to a common base—glycerine.

Oils are divided into *fixed* and volatile, or *essential*, oils. The latter evaporate and leave no stain on paper. The essential oils used for flavoring extracts can be produced *artificially*, and made to closely resemble the natural flavors. Unmedicated food is usually most wholesome for all persons in health.

Oleic (oil) acid is a liquid; stearic and palmitic acids are solids.

Stearin (stiff fat), margarine (pearly) and oleine (oil) are the neutral fats.

Glycerine is a colorless, odorless, syrupy liquid of sweetish taste, and mixes with, or is soluble in water and alcohol. To be pure it must be distilled or crystallized. With strong nitric acid glycerine forms *nitro-glycerine*, and reduces chromic acid, chlorinated lime, and permanganate of potassium with *great violence*. When used alone as a medicine glycerine is often irritating, especially to chapped hands, on account of its power to absorb water; and for this reason should not be used alone, but diluted with water or other liquids. Diluted with water it may be used to saturate tampons to be employed in leucorrhœa. It is antiseptic in its nature.

Nitro-glycerine (glonoin) is a heavy viscid liquid, very poisonous (has been used as a medicine), and explodes with terrific force. Mixed with earthy matter to give it consistence it forms dynamite, or giant powder.

Alcohols are hydrates of hydrocarbon radicals (hypothetical compounds). There are several forms of alcohol—the methylic, ethylic, amylic alcohol, and others. Methylic alcohol (methyl hydrate) is known as wood spirits, or wood naphtha, and is procured by the dry distillation of wood. This form of alcohol is very poisonous, and is sometimes mixed with 90 per cent. of ordinary alcohol to prevent, it is said, the latter from being used for drinking purposes. When thus contaminated it is sold for manufacturing and scientific purposes.

Ethylic, or *ethyl alcohol* (C_2H_6O), is the ordinary alcohol or spirits of wine. This is the ethyl hydroxide and the intoxicating principle of all spirituous liquors, though not so poisonous as the *amylic* alcohol, better known as "fusel oil." Brandy and whiskey contain from 40 to 50 per cent. of ethyl alcohol, and unless aged or rectified, they also contain more or less fusel oil (amylic alcohol). Wines contain from 17 to 7 per cent. of alcohol, and strong ale and porter 6 to 8 per cent.; lager beer 2 to 3 per cent. The alcohol of the United States Pharmacopœia contains 94 per cent. of absolute alcohol.

The fusel oil (amylic alcohol) of young and poor whiskey rapidly produces intoxication, gastric disturbance, and headache. The effect of ordinary alcohol upon the tissues is to harden them and

produce atrophy of the organs, and prevent the elimination of CO₂ from the lungs.

Sweet wines contain undecomposed sugar, while *dry* wines have all their sugar converted into alcohol; champagne and sparkling wines are bottled before fermentation ceases, so as to retain much CO₂ (carbonic acid gas) in solution. The only property of alcohol that is valuable in sickness is its *antiseptic* property. Rightly used in cases of Zymotic disease it may be serviceable, as an antiseptic, to arrest fermentation; but it must be free from amylic or methylic alcohol. *Rectified spirit*, or *deodorized* alcohol, is the safest for medicinal preparations, if it must be used.

Ether (improperly called sulphuric ether) is a volatile, colorless, highly inflammable liquid; and when mixed with air, explosive. It is used as an anaesthetic. Chloroform alone is *not* inflammable, but requires a large admixture of atmospheric air for safe breathing as an anaesthetic.

Vinegar (sour wine) is an impure very dilute acetic acid derived from wines, cider, etc., by fermentation. It usually contains about 5 per cent. of radical or pure acetic acid. It is valuable as an antiseptic when properly made. It is sometimes made or contaminated with *sulphuric acid* and is then very unwholesome. The purest acetic acid is known as glacial (icy) acetic acid, because it partially solidifies to an ice-like mass. It forms salts termed *acetate*. It is prepared in a crude form by the dry distillation of wood and is then called *pyrolichenous acid*. (Dry distillation is distilling without the addition of water.)

Glacial acetic acid has a pungent smell and is often put up in smelling bottles; it is also caustic in full strength and may be used to destroy warts, corns or fungous growths. For this purpose it may be diluted with an equal weight of glycerine.

Butyric acid is the product of decomposing butter and other fatty substances. It is found in rancid butter, and is often present in the stomach of despeptics.

Valerianic acid is also a product of decomposition and is found in the secretions during the progress of zymotic disease—typhus fever, small pox, etc.

Oxalic acid is a white, crystalline, irritant poison, derived from the action of nitric acid on sugar or starch. It exists in some

plants, notably in the sorrel and pie-rhubarb. If the latter is to be eaten, 'tis well to scald it and pour off the first water, so as to remove some of this acid.

Oxalic acid, and *potassium oxalate* are both used for removing ink and iron stains. The latter has, unfortunately, been called "salts of lemon," but it has no connection with lemon, and is a dangerous poison. The same salts have sometimes been mistaken for Epsom salts with fatal results.

Citric acid is found in lemons and limes. It is a crystalline solid, very soluble in water, and often used as a substitute for lemon juice. The fresh juice of the lemon is preferable to the prepared acid.

Caoutchouc (pronounced Koo-chook) is a resinous substance from trees of South America and the East Indies. It is also called gum elastic and India rubber. When melted with sulphur it forms *hard rubber*.

Menthol is a camphor contained in the oil of peppermint.

Nitrobenzine is a yellow oily liquid having the odor of bitter almonds, and for this reason is sometimes used in perfumery. It is very poisonous. It produces difficulty of the heart and lungs, convulsions, coma, and death.

Phenol has been improperly called carbolic acid. It is corrosive but not an acid. It acts when given or breathed like a protoplasmic poison. It is much used as a germicide, and in surgery as an antiseptic, though it is now being replaced by dilutions of corrosive sublimate, peroxide of hydrogen, etc.

Resorcin is a new product resembling phenol. It is used as an antipyretic and powerful germicide. It is given in doses of 5 to 20 grains. All these powerful germicides and antipyretics are poisonous in proportion to their power.

Salicylic acid is manufactured from phenol, although it is also found in the bark of the white willow (*Salix*). The pure acid is in fine, white, needle-shaped crystals. It is antiseptic, antipyretic, and antiperiodic. It is sometimes added to cider and milk to prevent souring. It is at the present time much used in *rheumatism*, fevers and zymotic disease. Dose 5 to 20 grains suspended in the infusion of gentian compound, or some pleasant syrup, as it has a disagreeable taste. It is very irritating to *mucous* surfaces and for

this reason should not be given in pill form or powder. The inhalation of the dust causes coughing and sneezing.

Cholesterin (solid bile) is a fusible and crystallizing substance that forms part of certain biliary calculi, or gall stones.

Alkaloids (resembling alkalies) are nitrogenous compounds that combine with acids to form salts. They are generally the active principle of the drug from which they are obtained and include the most violent poisons with which we are acquainted. They form insoluble tannates with tannin, and for that reason tannin is given as an antidote for them. They are divided into two classes: amines, which are gases or liquids, and amides, which are solids. They include morphine, coniine, nicotine, quinine, apomorphine, strychnine, atropine, etc. Nicotine and coniine are liquid, the others mentioned are solid. Nicotine is obtained from tobacco; coniine from conium (poison hemlock); quinine from Peruvian bark; morphine from opium; apomorphine from morphine and hydrochloric acid; atropine from belladonna; and strychnine from nux vomica.

Ptomaines (corpse or dead body) are putrefactive alkaloids; many of them are septic poisons. They are derived from organized bodies during the process of decomposition. They are really *unstable* compounds. They have been found in oysters, sausage, canned meats, etc.

Leucomaines are products of fermentation found in the living body. Xanthin hypoxanthin, creatin and creatinin are leucomaines. Nurine, muscarine, cadaverine, sepsine, putrescine, typhotoxine and tyrotoxine are ptomaines. Tyrotoxicon is the poisonous ptomaine of putrid cheese.

Proteids are albuminous bodies, or albuminoids. They nourish the *tissues* of the body when taken as food. They contain the four essential elements united with sulphur.

A *peptone* is a *soluble* albuminoid. The latter is changed to peptone in the stomach by the action of the gastric juice.

Mucin is the essential matter of mucus (the secretion of the mucous membrane). It differs from albuminoids in *not* containing sulphur.

Fibrin is a white elastic substance formed from the blood by coagulation. It forms the element for the tissues of the body.

Casein is a milk albuminoid; found in milk.

Gelatine is a substance found in cartilage and tendons. It forms glue.

Hæmoglobin is a contraction of hæmato-globulin. It forms the red corpuscles of the blood, and carries oxygen from the lungs to the tissues. When loaded with oxygen 'tis called oxyhæmoglobin, and when returning in the veins deprived of its oxygen 'tis called *reduced* hæmoglobin, or simply hæmoglobin.

The coloring matter of the bile is called bilirubin (red bile) and biliverdin (green bile). The color depends upon the nature of the food. In the herbivora it is green. The coloring matter of plants is termed chlorophyl (green leaf).

SYNONYMS.

Sulphate of magnesia is *Epsom Salts*.

Sulphate of iron is Copperas, or Green Vitriol.

Sulphate of copper is Blue Vitriol, or Bluestone.

Sulphate of zinc is White Vitriol.

Sulphuric acid is Oil of Vitriol.

Mercurial ointment is Unguentum (sometimes but improperly called Anguintum).

Mercurial pill is Blue Pill.

Mercurial nitrate ointment is Citrine Ointment. It is so called because of its *yellow* color, like lemon.

Potassium bitartrate is Cream Tartar, or Cr. of Tartar.

Potassium nitrate is Nitre or Saltpetre.

Poke is Garget unless otherwise distinguished.

Indian poke is Veratrum Viride.

Powder of aloes and canella is Picra (bitter).

Powder of ipecac and opium is Dover's Powder.

Carbonate of soda is Sal Soda or Washing Soda.

Bicarbonate of soda is Baking Powder.

Camphorated tincture of opium is Paregoric.

Treacle is Theriaca or Molasses.

Hydrastis is Golden Seal.

American hellebore is Veratrum Viride (*Indian Poke*).

Bearberry is uva ursi.

Blue flag is *Iris*.

Black snake root is Cimicifuga. (Black Cohosh).
Bloodroot is Sanguinaria.
Croton oil is Oleum Tiglii.
Lard is Adeps.
Licorice is Glycyrrhiza.
Ox gall is Fel Bovis.
Pleurisy Root is Asclepias.
Indian hemp is Cannabis Indica.
Henbane is Hyoscyamus.
Gum Arabic is Acascia.
Elder is Sambucus.
Sage is Salvia.
Pipsissewa is Chimaphila.
Thoroughwort is Eupatorium (Boneset).
Wintergreen is Gaultheria.
Witchhazel is Hamamelis.
Wahoo is Euonymus.
Fowler's solution is Liquor Potassii Arsenitis.
Fox glove is Digitalis.
Aqua fortis (strong water) is Nitric Acid.
Aqua regia (royal water) is Nitrohydrochloric Acid.
Calomel is the Chloride of Mercury, or Hydrargyri Chloridum
Mite (mild), and
Corrosive sublimate is the Bichloride of Mercury or Hydrargyri
Chloridum Corrosivum.

A minim is the sixtieth of a drachm. Of most fluids 'tis less than a drop, but of some more.

Gr. stands for grain ; Gtt. (gutta) stands for a drop ; M (misce) signifies mix ; O (octarius) stands for *one pint* ; R (recipe) signifies take ; S or Sig. (signa) means write ; Ss or ss (semisse) signifies *one half* ; Chart. (chartula—a little paper) stands for *a powder*.

The term "Dover's Powder" has been changed to *Powder of Ipecac and Opium*. It is composed of powdered opium 1 part, Powdered Ipecac 1 part, and Sugar of Milk 8 parts. Used in fevers. We think it may be improved still further by substituting

powdered camphor for one half the opium. Dose of the mixture 1 to 5 grains.

Compound Liquorice Powder contains the following: Senna, Licorice, and Fennel (all in No. 60 powder), 18, 16, and 8 parts respectively, washed sulphur 8, and sugar 50 parts; mix. Used as a laxative. Dose—a teaspoonful at bedtime.

A litre is a little less than an English quart, but is more (about 5 per cent.) than the U. S. quart.

A pint of water will dissolve 5 grains of camphor. *Camphor may be powdered* by first adding a small quantity of alcohol (enough to moisten it) then rubbing in a mortar.

Eleven minims of *tincture of opium* (Laudanum) represents one grain of opium. A grain is a very large dose of opium for an adult not accustomed to it. A full dose of opium is *not to be repeated* for at least *four hours*. A good and simple rule for grading the dose is to give to a child such a proportion of the adult dose as the age of the child bears to 20 yrs.

The No. of a powder (20 to 60, or 80) designates the fineness of the sieve through which the powder must pass. No. 20 (a coarse powder) signifies that the sieve contains 20 meshes, or wires to the linear inch. 60 is a fine powder; 80 very fine.

White lead, which is poisonous, is sometimes used to adulterate beeswax. Such wax should not be put in the mouth.

Chlorate of potash (Potassium chlorate) is *liable to explode* if mixed with organic or combustible bodies.

Permanganate of potash and glycerine are almost sure to explode if mixed together. Permanganate of potash, alcohol and water make a dangerous compound.

The specific gravity of alcohol of the new Pharmacopœia (1880) is .820; absolute alcohol .794; dilute alcohol .928. Dilute alcohol contains 54½ parts of water to the 100.

The best solvent for myrrh is alcohol; for boric acid, glycerine and hot water; for resins, alcohol; for gums, water; for camphor, alcohol; and for sulphur, bi-sulphide of carbon.

The active principle of Cimicifuga is *macrotin*; of Culver's root, *leptandrin*; of Cinchona, *quinia*; of Belladonna, *atropine*; of opium, *morphine*; and of Podophyllum, *podophyllin*.

Fowler's solution contains 1 per cent. of arsenic. Powder of ipecac and opium contains 10 per cent. of opium.

An ounce avoirdupois contains 437.5 grains.

The Apothecaries' ounce contains 480 grains; but the *pound* avoirdupois is the larger (by 1240 grains) because it has 16 ounces, while the apothecary pound has only 12 ounces. The apothecary ounce is divided into 8 drachms; each drachm into 3 scruples; and each scruple into 20 grains; making 5760 grains in the apothecary pound, while the avoirdupois has 7000 grains. The Troy or Apothecaries' ounce is 42½ grains heavier than the avoirdupois ounce.

The Apothecaries' table for liquid measure is 60 minimis make one drachm; 8 drachms, one ounce; 16 fluid ounces, one pint; 2 pints, 1 quart; and 4 quarts one gallon.

A teaspoonful is equivalent to a drachm; a dessertspoonful to 2 drachms; a tablespoonful to half an ounce; and a wineglass to 2 ounces.

The litre is equivalent to 38.82 ounces, or 2.11 pints.

A gram (French "*gramme*") contains about 15½ grains. In the metric system all weights are in grams or decimals of a gram; and in writing a prescription the whole grams are written to the *left* of a straight vertical line and the decimals on the *right* of the same line.

Abstracts are preparations containing the soluble principles of the drug, mixed with sugar of milk, evaporated to dryness and powdered. They are twice the strength of the drug itself, more permanent and portable. There are eleven official abstracts. The four most prominent and reliable are *aconite root*, *podophyllum*, *nux vomica*, and *jalap*. The dose is one half that of the drug itself.

Aqua (waters), in pharmacy, are aqueous solutions ~~in~~ volatile substances.

Carbolic acid water is made by mixing one fourth of an ounce, each, of carbolic acid crystals and glycerine in a mortar and then adding a pint of distilled water. Used as a gargle, wash or spray.

Aqua Ammonia (ammonia water) contains 10 per cent of ammonia; *aqua ammonia fortior* (stronger ammonia water) has 28 per cent of ammonia.

The best *orange flower water* is imported from France as "Triple Orange Flower Water." To the French preparation the Pharmacopœia allows to be added two thirds its volume of distilled

water. It cannot be made from the oil of orange flowers (oil of neroli). Is used for flavoring medicated syrups.

Lime water contains a small fraction (.15) of one per cent. of lime. It is used to *neutralize acidity of the stomach*; in rickets to supply lime to the bones; and as a spray or vapor in *diphtheria*.

Camphor water is an aqueous solution of camphor. Each pint contains from 3 to 5 grains of camphor. It may be quickly made by putting a teaspoonful of spirits of camphor into a pint of water and straining the mixture. It is more nicely made by saturating clean cotton with spirits of camphor, allowing the cotton to dry or nearly so, which it quickly does, and then percolating through it, packed into a percolator, distilled water. One drachm of camphor gum dissolved in twice its weight of alcohol is sufficient for one pint of camphor water. It is a most valuable medicine in all zymotic fevers—scarlatina, typhoid fever, diphteria, erysipelas, small pox, measles, etc. Dose, a tablespoonful several times a day, and in bad cases *every hour* for one or two days.

There are 14 or 15 official aquæ. Only two are prepared by distillation—orange flower, and rose water. The others are prepared by simple solution, or by filtration.

There are four official *vinegars* (aceta) prepared by dissolving the drug in dilute acetic acid. The four vinegars are opium (aceta opii), squills (scillæ), lobelia and bloodroot. The vinegar of opium contains a little nutmeg and sugar besides the opium and acid. Formerly cider vinegar, or wine vinegar, was used; now dilute acetic acid is used.

There are *two* official *balsams*—Balsam of Tolu, and Balsam of Peru. *Balsam of Tolu* is chiefly used in cough medicines to make them more agreeable to the taste. *Balsam of Peru* is a general stimulant and expectorant. It is used to check an excessive discharge of mucus in bronchitis and catarrh (a disease of mucous membranes), and, externally, as an application to chilblains, ulcers and sore nipples, and as an ointment to cure the itch. It is nearly insoluble in water, and is given in emulsion or mucilage. Rubbed up with the white of an egg it is used as an application to bed sores. Dose, 5 to 15 minims.

Medicated wines are vinous liquid preparations. The *Wine of Ipecac* is less disagreeable than other preparations of that drug. Vi-

num Album Fortius (stronger white wine) is white wine containing one pint of alcohol to a gallon. If *rectified* alcohol is used it makes a good antiseptic.

There are 16 official *troches* (lozenges) composed of sugar and mucilage, medicated, and intended to dissolve slowly in the mouth. They contain morphine, opium, ipecac, tannin, peppermint, chlorate of potash, etc. There are 73 official *tinctures*. They are generally prepared with dilute alcohol, but tinctures of myrrh and cayenne are prepared in nearly *pure alcohol* in order to make them clear. Glycerine is sometimes added to prevent tinctures from precipitation on standing. Tinctures are made by maceration, percolation, solution or dilution. Tincture of iodine is made by dissolving the iodine in alcohol.

Simple Syrup is 65 parts white sugar dissolved in 35 parts pure water; or, 13 to 7 of sugar and water, dissolved by the aid of heat and strained while hot.

Simple Cerate (*cera*, wax) is made by melting together white wax and lard, 3 and 7 parts each. Yellow wax might be used. It is applied to raw surfaces to protect them; and is used as a vehicle for more active medical applications. There are 8 official cerates. Among them are *Goulard's*, and *Camphor Cerate*.

Fluid extracts are alcoholic solutions, representing one grain of the drug to each minim. They are uniform, and more definite and concentrated than tinctures. Glycerine is sometimes used to prevent precipitation. There is a great number of fluid extracts, but only one *compound fluid extract* (*Sarsaparilla*). The latter contains sarsaparilla, licorice, sassafras, mezereum, glycerine, alcohol and water. Used as a blood purifier in scrofula, etc.

Mezereum is a powerful sialogogue, and irritant poison. It forms about 3 per cent. of the medicinal ingredients in the above compound.

The Compound *Decoction of Sarsaparilla* also contains mezereum. There are in the *Pharmacopœia* 12 decoctions. Sarsaparilla, Iceland Moss (*Decoctum cetrariae*), Pipsissewa (*Chimaphila*), Cinchona (yellow and red), Senega (Rattlesnake root), and Uva Ursi, are the more important of the decoctions.

NAMES OF THE ELEMENTS.

COMPLETE TO THE PRESENT TIME.

Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Bromine, Cadmium, Caesium, Calcium, Carbon, Cerium, Chlorine, Chromium, Cobalt, Columbium, Copper, Decipium, Didymium, Erbium, Fluorine, Gallium, Glucinum, Gold, Holmium, Hydrogen, Indium, Iodine, Iridium, Iron, Lanthanum, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Niobium, Nitrogen, Norwegium, Osmium, Oxygen, Palladium, Phosphorus, Platinum, Potassium, Rhodium, Rubidium, Ruthenium, Scandium, Selenium, Silver, Silicon, Sodium, Strontium, Sulphur, Tantalum, Tellurium, Terbium, Thallium, Thorium, Thulium, Tin, Titanium, Tungsten, Uranium, Vanadium, Ytterbium, Yttrium, Zinc, Zirconium. Total, 73.

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